

Commonwealth of Pennsylvania

DEPARTMENT OF AGRICULTURE

BULLETIN No. 222.

PROCEEDINGS OF THE  
THIRTY-FIFTH ANNUAL MEETING

OF THE

Pennsylvania  
State Board of Agriculture



HELD IN THE

CAUCUS ROOM, HOUSE OF REPRESENTATIVES, HARRISBURG, PA.

January 24 and 25, 1912.

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HARRISBURG:

C. E. AUGHINBAUGH, PRINTER TO THE STATE OF PENNSYLVANIA.  
1912



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# MEMBERS

OF THE

## PENNSYLVANIA STATE BOARD OF AGRICULTURE,

FOR THE YEAR 1912

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### **MEMBERS EX-OFFICIO**

HON. JOHN K. TENER, Governor  
 HON. HENRY HOUCK, Secretary of Internal Affairs  
 DR. N. C. SCHAEFFER, Superintendent of Public Instruction  
 DR. EDWIN ERLE SPARKS, President of the State College  
 HON. A. E. SISSON, Auditor General  
 HON. N. B. CRITCHFIELD, Secretary of Agriculture

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### **APPOINTED BY THE GOVERNOR**

R. I. Young, Middletown, Dauphin County, .....Term expires 1911  
 Gen. James A. Beaver, Bellefonte, Centre County, .....Term expires 1913  
 R. H. Thomas, Jr., Mechanicsburg, Cumberland County, .....Term expires 1915

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### **APPOINTED BY THE STATE POULTRY ASSOCIATION**

J. D. Nevius, .....Philadelphia,.....1910

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### **APPOINTED BY THE PENNSYLVANIA BRANCH OF THE AMERICAN POULTRY ASSOCIATION**

W. Theo. Wittman, .....Allentown,.....1913

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### **APPOINTED BY THE PENNSYLVANIA BEE-KEEPERS ASSOCIATION**

William A. Selser, .....Philadelphia,.....1915  
 C. S. Swanson (Alternate), .....Philadelphia,.....1912

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### **ELECTED BY COUNTY AGRICULTURAL SOCIETIES**

	Term expires.
Adams, .....A. I. Weidner, .....Arendtsville,	1915
Allegheny, .....A. J. Purdy, .....Imperial, R. F. D. No. 1,	1915
Armstrong, .....S. S. Blyholder, .....Kelly Station,	1914
Beaver, .....A. L. McKibben, .....New Sheffield,	1914

Term expires.

Bedford, .....	Wm. F. Biddle, .....	Everett, .....	1915
Berks, .....	H. G. McGowan, .....	Geiger's Mills, .....	1913
Blair, .....	W. Frank Beck, .....	Altoona, .....	1914
Bradford, .....	F. D. Kerrick, .....	Towanda, .....	1913
Bucks, .....	B. Frank Wambold, .....	Sellersville, .....	1914
Butler, .....	W. H. Milliron, .....	Euclid, .....	1914
Camhria, .....	Jas. Westrick, .....	Patton, R. F. D. No. 2, .....	1913
Cameron, .....			
Carbon, .....			
Centre, .....	John A. Woodward, .....	Howard, .....	1915
Chester, .....	M. E. Conard, .....	Westgrove, .....	1915
Clarion, .....	J. H. Wilson, .....	Clarion, .....	1913
Clearfield, .....	Peter Gearhart, .....	Clearfield, .....	1913
Clinton, .....	J. A. Herr, .....	Millhall, R. F. D., .....	1914
Columbia, .....	A. P. Young, .....	Millville, .....	1912
Crawford, .....	J. S. Patton, .....	Hartstown, .....	1914
Cumherland, .....			
Dauphin, .....	Edward S. Keiper, .....	Middletown, .....	1914
Delaware, .....	E. J. Durnall, .....	Swarthmore, .....	1914
Elk, .....	John M. Wittman, .....	St. Mary's, .....	1915
Erie, .....			
Fayette, .....			
Forest, .....			
Franklin, .....	John P. Young, .....	Marion, .....	1914
Fulton, .....	J. L. Patterson, .....	McConnellsburg, .....	1913
Greene, .....	N. M. Biddle, .....	Carmichaels, .....	1913
Huntingdon, .....	Geo. G. Hutchison, .....	Warrior's Mark, .....	1915
Indiana, .....	S. C. George, .....	West Lebanon, .....	1913
Jefferson, .....	Peter B. Cowan, .....	Brookville, .....	1913
Juniata, .....	Matthew Rodgers, .....	Mexico, .....	1915
Lackawanna, .....	Horace Seamans, .....	Factoryville, .....	1913
Lancaster, .....	J. Aldus Herr, .....	Lancaster, .....	1914
Lawrence, .....	Sylvester Shaffer, .....	New Castle, .....	1913
Lebanon, .....	H. C. Snaveley, .....	Cleona, .....	1913
Lehigh, .....	P. S. Fenstermaker, .....	Allentown, .....	1915
Luzerne, .....	J. E. Hildebrant, .....	Dallas, .....	1914
Lycoming, .....	A. J. Kahler, .....	Hughesville, .....	1915
McKean, .....	O. W. Abbey, .....	Turtle Point, .....	1913
Mercer, .....	W. C. Black, .....	Mercer, .....	1914
Mifflin, .....	M. M. Naginey, .....	Milroy, .....	1913
Monroe, .....	F. S. Brong, .....	Saylorsburg, .....	1913
Montgomery, .....	John H. Schultz, .....	Norristown, .....	1914
Montour, .....	J. Miles Derr, .....	Milton, R. F. D., .....	1913
Northampton, .....	C. S. Messinger, .....	Tatamy, .....	1915
Northumberland, .....	I. A. Eschbach, .....	Milton, R. F. D., .....	1914
Perry, .....	A. T. Holman, .....	Millerstown, .....	1913
Philadelphia, .....	David Rust, .....	Philadelphia, .....	1913
Pike, .....	B. F. Killam, .....	Paupack, .....	1915
Potter, .....			
Schuylkill, .....	John Shoener, .....	New Ringgold, .....	1913
Snyder, .....			
Somerset, .....	John C. Weller, .....	Rockwood, .....	1914
Sullivan, .....	J. G. Cott, .....	Forksville, .....	1915
Susquehanna, .....	Frank A. Davies, .....	Montrose, .....	1913
Tioga, .....	Calvin H. DeWitt, .....	Mansfield, .....	1914
Union, .....	J. Newton Glover, .....	Vicksburg, .....	1914
Venango, .....			
Warren, .....	R. J. Weld, .....	Sugargrove, .....	1914
Washington, .....	D. S. Taylor, .....	Burgettstown, .....	1914
Wayne, .....	Warren E. Perham, .....	Pleasant Mount, .....	1914
Westmoreland, .....	M. P. Shoemaker, .....	Greensburg, .....	1913
Wyoming, .....	D. A. Knuppenburg, .....	Lake Carey, .....	1913
York, .....	G. F. Barnes, .....	Rossville, .....	1914

# OFFICERS

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## PRESIDENT

Hon. John K. Tener, Governor, ..... Harrisburg

## VICE PRESIDENTS

Horace Seamans, ..... Factoryville  
I. A. Eschbach, ..... Milton, R. F. D.  
John H. Schultz, ..... Norristown

## EXECUTIVE COMMITTEE

Dr. W. Frank Beck, Chairman, ..... Altoona  
M. M. Naginey, ..... Milroy.  
P. S. Fenstermaker, ..... Allentown  
A. T. Holman, ..... Millerstown  
Wm. F. Biddle, ..... Everett, R. F. D.  
H. C. Snavely, ..... Cleona  
Dr. M. E. Conard, ..... Westgrove  
D. S. Taylor, ..... Burgettstown  
W. C. Black, ..... Mercer  
N. B. Critchfield, Secretary, ..... Harrisburg

## ADVISORY COMMITTEE, CONSULTING SPECIALISTS AND STANDING COMMITTEES AS REPORTED BY THE EXECUTIVE COMMITTEE

### ADVISORY COMMITTEE

Dr. M. E. Conard, ..... Westgrove  
A. T. Holman, ..... Millerstown  
M. M. Naginey, ..... Milroy

### COMMITTEE ON RESOLUTIONS

Col. J. A. Woodward, Chairman, ..... Howard  
Matthew Rodgers, ..... Mexico  
Joel A. Herr, ..... Millhall  
M. P. Shoemaker, ..... Greensburg  
P. S. Fenstermaker, ..... Allentown

### CONSULTING SPECIALISTS

Botanist, ..... Prof. W. A. Buckhout, ..... State College  
Pomologist, ..... Chester J. Tyson, ..... Floradale  
Chemist, ..... Dr. Wm. Frear, ..... State College  
Veterinary Surgeon, ..... Dr. C. J. Marshall, ..... Harrisburg  
Sanitation and Health, ..... Dr. W. Frank Beck, ..... Altoona  
Microscopist and Hygienist ... Prof. J. W. Kellogg, ..... Harrisburg  
Entomologist, ..... Prof. Franklin Menges, ..... York  
Ornithologist, ..... Prof. H. A. Surface, ..... Harrisburg  
Meteorologist, ..... E. R. Demain, ..... Harrisburg  
Mineralogist, ..... Dr. Isaac A. Harvey, ..... Lock Haven  
Apiarist, ..... H. C. Klinger, ..... Liverpool  
Economic Geologist, ..... Baird Halberstadt, ..... Pottsville  
Agricultural Geologist, ..... W. H. Stout, ..... Pinegrove  
Forests and Forestry, ..... Robert S. Conklin, ..... Harrisburg  
Feeding Stuffs, ..... G. G. Hutchison, ..... Warrior's Mark

## STANDING COMMITTEES

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### LEGISLATION

J. H. Wilson, Chairman, ..... Clarion  
Peter Gearhart, ..... Clearfield  
E. J. Durnall, ..... Swarthmore  
S. S. Blyholder, ..... Kelly Station  
Calvin H. DeWitt, ..... Mansfield

### CEREALS AND CEREAL CROPS

J. Newton Glover, Chairman, ..... Vicksburg

### ROADS AND ROAD LAWS

J. L. Patterson, Chairman, ..... McConnellsburg

### FRUIT AND FRUIT CULTURE

Wm. F. Biddle, Chairman, ..... Everett, R. F. D.

### DAIRY AND DAIRY PRODUCTS

R. J. Weld, Chairman, ..... Sugargrove

### FERTILIZERS

J. Aldus Herr, Chairman, ..... Lancaster

### WOOL AND TEXTILE FIBERS

D. S. Taylor, Chairman, ..... Burgettstown

### LIVESTOCK

Dr. M. E. Conard, Chairman, ..... Westgrove

### POULTRY

W. Theo. Wittman, Chairman, ..... Allentown

PROCEEDINGS OF THE THIRTY-FIFTH ANNUAL MEETING OF THE STATE BOARD  
OF AGRICULTURE, HELD IN THE HOUSE OF REPRESENTATIVES CAUCUS ROOM,  
CAPITOL BUILDING, HARRISBURG, PA., JANUARY 24 AND 25, 1912.

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Harrisburg, Pa., January 24, 1912.

Vice-President G. G. Hutchison in the Chair.

The CHAIRMAN: The Board will please come to order, and the Secretary will call the roll.

The roll of members was then called by the Secretary, and at this and subsequent roll calls the following persons answered:

R. H. Thomas, Jr., Gen. James A. Beaver, A. I. Weidner, A. J. Purdy, Wm. F. Biddle, H. G. McGowan, W. Frank Beck, F. D. Kerrick, B. Frank Wambold, W. H. Milliron, John A. Woodward, M. E. Conard, J. H. Wilson, Peter Gearhart, J. A. Herr, A. P. Young, John M. Wittman, John P. Young, J. L. Patterson, Geo. G. Hutchison, S. C. George, Matthew Rodgers, Horace Seamans, J. Aldus Herr, Sylvester Shaffer, H. C. Snaveley, P. S. Fernstermaker, J. E. Hildebrant, A. J. Kahler, W. C. Black, M. M. Naginey, F. S. Brong, John H. Schultz, J. Miles Derr, C. S. Messinger, I. A. Eschbach, A. T. Holman, B. F. Killam, John Shoener, John C. Weller, Frank A. Davies, Calvin H. DeWitt, J. Newton Glover, D. S. Taylor, M. P. Shoemaker, D. A. Knuppenburg and G. F. Barnes.

Ex-Officio Members: Dr. N. C. Schaeffer, Superintendent of Public Instruction; Dr. Edwin Erle Sparks, President of the State College, and Hon. N. B. Critchfield, Secretary of Agriculture.

The following consulting specialists were also in attendance: Prof. J. W. Kellogg, Microscopist and Hygienist; Prof. Franklin Menges, Entomologist; Prof. H. A. Surface, Ornithologist; Baird Halberstadt, Mineralogist; H. C. Klinger, Apiarist; Dr. Isaac A. Harvey, Economic Geologist; W. H. Stout, Agricultural Geologist; Robert Conklin, Forests and Forestry; G. G. Hutchison, Feeding Stuffs.

The SECRETARY: (After calling of roll). There is a quorum present, Mr. Chairman.

The CHAIRMAN: We are now ready to proceed with the reading of the minutes. The Secretary will now read the minutes of the Spring Meeting of State Board of Agriculture, held in the Court House at Lancaster, Pa., May 23, 1911.

The minutes were then read by the Secretary.

The CHAIRMAN: Gentlemen, you have heard the reading of the minutes. Are there any corrections?



There being no corrections, on motion, properly seconded and carried in the regular way, the minutes were approved as read.

The CHAIRMAN: The next item on the program calls for the report of the Committee on Credentials; I will appoint on this committee the following gentlemen:

Peter Gearhart, of Clearfield; S. C. George, of Indiana; John H. Schultz, of Montgomery; I. A. Eschbach, of Northumberland; J. Newton Glover, of Union and M. P. Shoemaker, of Westmoreland.

If there are any Granges or other organizations who have sent representatives here, please turn over your Credentials to this committee and they will be passed upon.

The SECRETARY: There is no other committee to be appointed at this time.

The CHAIRMAN: The next thing in order is Item 5, on the program: Reports of Standing Committees. The first of these is the Report of J. Miles Derr, on Cereals and Cereal Crops.

Mr. Derr's report is as follows:

## REPORT OF THE COMMITTEE ON CEREALS AND CEREAL CROPS

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By J. MILES DERR, *Chairman*.

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Agriculture is really our most important industry because it furnishes so many raw materials for our manufacturers. Flour could not be made without wheat, nor cloth without cotton, wool or other fibre. Of all our farm products, the grains or "cereals," are the most valuable. They are the seeds of certain cultivated grasses, growing in all climates, from the Equator to the Arctic Circle.

In many respects, wheat may be considered the "King of the Cereals;" while as a wealth producer, "Corn is King," with a value more than twice that of the cotton crop this year, and but little less than the combined values of the cotton, wheat and oats crops. Corn is by far the leading crop of the United States as a wealth producer.

The estimate of 2,776,000,000 bushels indicates a production that has been exceeded only in two years. The farm price of corn is now high, and this establishes a total value for the crop that reaches \$1,700,000,000 and breaks the record. According to this year's report, it has been proven that a large crop may be worth less to the producer than a small one and a small crop may be worth more than a large one.

The cotton crop of this year, commonly supposed to be the largest one ever grown, has reached a price of lint that is five cents a pound below that of last year, and for the same reason the price of seed

has declined. Apparently, the value of fibre and seed of this year's crop is below the value of the last two years, although above the value of the five preceding years. There is no crop that this country produces that excites such world-wide interest as cotton, for the reason that the crop of the United States is about three-fourths of the world's production.

Barley is a crop this year deficient in production. The 146,000,000 bushels are 12 per cent. below the last five year average; but the total value of the crop is about \$125,000,000, and much above the record value of 1907.

In this report I desire to confine my remarks to wheat, and try to give some reasons why we should produce better crops of this important cereal in our State.

#### WHEAT FALLING OFF

Wheat has fallen from second to fourth in order of value, and is worth \$600,000,000. The estimate of the Department places the production this year at 656,000,000 bushels, an amount that would have been much exceeded had weather conditions been more favorable and less Hessian fly. This country produced one-fifth of the world's wheat crop during the last five years, and contributed about one-eighth of the world's exports. The world's wheat crop is about 3,162,000,000 bushels, and is about two bushels apiece for the world's people.

Wheat is one of the most important grains known to man. Although wheat was not known in this hemisphere before Columbus came, our continent now produces more wheat than any of the other grand divisions of the globe. We send millions of bushels of wheat annually across the Atlantic, and, with the exception of cotton, we get more for our wheat from foreign countries than for any other crop.

In Minnesota and the Dakotas there is a region known as the Red River Valley which might be called the "Bread Basket of North America." The wheat farms there are of vast extent and are managed on a grand scale.

Kansas has for several years held the honor of being the greatest wheat-producing state in the Union. North Dakota ranks second among the wheat-producing states, and has immense farms in the valley of the Red River, in some instances, containing as many as 30,000 acres. Each of these is operated under a highly developed system, and in summer often employs from 200 to 300 men.

The soil of North Dakota is a rich alluvial loam, ranging from six inches to three feet, with a clay subsoil that retains the natural moisture. These conditions create the wonderful productivity that has given the Dakotas a world-wide fame. On the great "bonanza farms" of the eastern counties may be seen grain fields often miles in extent, and in harvest time, with the long line of reapers sweeping across a yellow set of standing grain, they present a scene that fills the mind of the on-looker with admiration.

The largest percentage of acreage in Minnesota is devoted to the cultivation of its wheat crop, and the state ranks third in the value of its wheat crop.

Across the border line from Minnesota into Canada we find about 4,000 square miles of the richest wheat land in the world. The deposits of clay and silt left by the receding Lake Agassiz, overlaid by from two to four feet of black vegetable mold, are the fertile wheat lands of Manitoba. The soil is a rich, deep loam resting on a deep clay subsoil. It is well adapted to wheat growing. In 1902, when the harvest was exceptionally good, the yield of the province averaged 26 bushels to the acre.

#### HARVESTING ON A GREAT WHEAT FARM

On the immense wheat farms of the Pacific Coast, the most elaborate devices have been called into play to serve the grain growers. It is only these states of the Far West that there can be seen in operation the combined harvester and thresher, a miracle of modern invention, which dragged slowly across a field, cuts the standing grain, threshes it as it moves, and drops the filled and tied sacks to be gathered up by the wagons that follow. Some of these great machines are drawn by steam engines; others by teams of twenty-five to thirty horses and mules. A single machine with four men will gather and thresh from seventeen hundred to three thousand bushels of wheat in a day.

But how are these great crops of wheat cared for after they leave the field? This is almost as great a business as raising the wheat. At some of the railroad stations and at all the large grain ports, there are large elevators, or granaries, for storing grain until it is wanted for sale. There are such granaries at New York and New Orleans, and at all the large cities upon the Great Lakes. There are many of them at Minneapolis, and a single one has storage room for more than a million bushels of grain. The elevators at Minneapolis alone can hold almost thirty million bushels at one time.

Elevators are usually built along the wharf and by the railroad siding. Some of them are built as high as a six-story house. The grain is moved to the upper part of the mill by an endless chain of little buckets of tin or zinc, there it is weighed and poured into the deep bins. When it is taken out it flows through pipes into the cars or the ships which are to carry it to the markets.

There are elevators of this kind at the ports at the head of Lake Superior, into which the grain is taken from the cars, and later poured into the steamers which are to take it down the Great Lakes to Buffalo, whence it is carried through the Erie Canal to New York, to be shipped to Europe.

Minneapolis is a magnificent city of more than a quarter of a million inhabitants. It is situated on the Mississippi, at the falls of St. Anthony. These falls furnish a water power as great as could be given by forty thousand horses pulling at once, and their situation so near our wheat lands has made Minneapolis one of the milling centers of the world. There are numbers of big flour mills here which are grinding away day and night. One single mill can grind twenty thousand barrels of flour in a day.



## HOW THE GREAT LAKES BENEFIT THE FARMERS OF THE GREAT WHEAT FARMS OF THE NORTHWEST AND EQUALIZE THE PRICES OF CEREALS IN OUR COUNTRY

Duluth and Superior City, built at the western end of Lake Superior, are at the head of navigation on the Great Lakes. They have fine harbors and great docks and grain elevators are built there. Duluth is at the eastern end of the Northern Pacific Railroad, and receives immense quantities of wheat from the large farms of the valley of the Red River, which is probably the most perfect wheat farming region in the world.

Let us now listen to how the grain is taken from the great elevators and carried to the eastern and foreign markets. We may see the famous whaleback steamships which carry immense quantities of iron ore and grain, lying under the shadows of huge wheat elevators at the wharves of Duluth. They are more like enormous barrels than like steamships, and as they lie there in the water they make us think of some sea monster or whale. They are now being filled with wheat which is poured into their holds by pipes from the elevators.

Thousands of bushels of grain will be stored in a single whaleback vessel within a few hours, and the load it will carry will be more than could be hauled by a train of two horse wagons ten miles in length. The average load of a whaleback is about 70,000 bushels of wheat.

The chain of Great Lakes forms one of the chief commercial highways of the globe. The upper portions of these lakes are frozen during the winter, and for five months they are almost as deserted as the icy seas about the North Pole. It is only during the seven warmer months that ships can navigate them; but in this time more freight is carried upon them than all that is brought into Liverpool or London in a whole year.

Were it not for these lakes our immense harvests of grain could hardly be taken to the seashore. A whaleback will steam out with its great load of 70,000 bushels of wheat to Buffalo, or it may even pass through the Welland Canal and go on down through Lake Ontario into the St. Lawrence River, and out across the Atlantic to the seaports of Europe. There is a navigable waterway from Duluth to the sea, and if the destination of our whaleback is Liverpool, it will have to travel more than half of its voyage in fresh water before it gets to the Atlantic Ocean, at the Strait of Belle Isle.

### LOW FREIGHT RATES

The journey can be made so cheaply that for a few cents a bushel of wheat can be brought from the greatest wheat farms in the world, which are located in the heart of North America, to the seaboard, and for thirty cents a ton can be brought from Buffalo back to Duluth. The cost of carrying grain by water in this way is less than one-half the cost of carrying on railroads. It is this cheapness that has caused many towns and cities to spring up at the harbors along the Great Lakes, and due to these cheap freights that the price of wheat is nearly the same in Chicago as in Philadelphia and New York.

In years to come as population increases and the demand for food becomes greater, it will become necessary for the cereal farmer to pay more attention to maintaining and increasing the fertility of his soil. We have seen soils in our locality, which thirty years ago produced from 25 to 30 bushels of wheat per acre, cropped so frequently with wheat that the yield was brought down to 12 to 15 bushels per acre. The same land after changing owners, and the owner himself becoming the operator, has restored and finally increased the fertility and yield to 32 bushels per acre. What is true in this instance is true and may be in many others. We think that a greater percentage of our farms should be operated by their owners, and it appears that something must be seriously wrong or they would be.

In many states about 50 per cent. of the farms are operated by tenants. The last census report shows that nineteen counties of Pennsylvania have lost in numbers of people. Iowa, which is strictly a cereal producing state, has less people than it had ten years ago, showing that farmers and farm laborers are leaving the farm homes and going to manufacturing cities.

Pennsylvania farms should be operated by their owners, more cattle fed upon them, less grain, hay, and straw sold from them, and as a result a very much greater yield would be secured. A large percentage of our Pennsylvania soils have not been worked more than 100 years and seem to be worn out, but they are not, simply robbed and can be restored. England and Germany have worked their soils for about 2,000 years and produce about 100 per cent. more grain than we do. Let us follow their example.

The CHAIRMAN: Next is the Report of the Committee on Roads and Road Laws, Hon. J. C. Weller, Chairman.

Mr. Weller then read the following report:

## REPORT OF THE COMMITTEE ON ROADS AND ROAD LAWS

---

By HON. J. C. WELLER, *Chairman*.

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The Legislature of 1911 passed upon more road legislation of far-reaching consequences and greater importance than any previous legislation in the history of the Commonwealth. By the act of May 31, 1911, the Highway Department of the State was reorganized, consisting at present of a Highway Commissioner, a First Deputy Highway Commissioner, a Second Deputy Highway Commissioner, a Chief Engineer and a largely increased clerical force in all of its departments.

Section 6, states the purpose of this Act, that all those existing public roads, highways, turnpikes and toll roads or any parts or portions thereof, subject to the provisions hereinafter made in the case

of turnpikes and tollroads, forming and being main traveled roads or routes between county seats of the several counties of the Commonwealth and main traveled roads or routes leading to the State line, and between principal cities, boroughs and towns, shall be known marked, built, rebuilt, constructed, repaired and maintained by and at the sole expense of the Commonwealth; and shall be under the exclusive authority and jurisdiction of the State Highway Department and shall constitute a system of State highways, the same being more particularly described and defined as follows: Route No. 1, from Harrisburg to Sunbury to Danville, and thus continuing Route No. 296, from Scranton to New York State line, completing a net work of highways that will connect the county seats and principal cities and boroughs of the Commonwealth.

All of which is conditioned upon Joint Resolution No. 3, passed by the last Legislature amending the Constitution of the State as follows: "That the General Assembly may authorize the State to issue bonds to the amount of fifty million of dollars for the purpose of improving and rebuilding the highways of the Commonwealth." As a rule, farming communities are not in favor of bonding the State. Where the money derived from the sale of bonds is to be used in building a system of State highways which would mean so much to the rural Commonwealth, there should be little opposition to such a plan. When the amendment is submitted to the popular vote, as it will be required after favorable action by the next Legislature, there should be no hesitancy in its adoption by a large majority of the voters of the Commonwealth. Of the provisions of the Act the one likely to meet with most serious criticism is Section 8. "Whenever in the construction, reconstruction, maintenance, and repair of any of the State highways it shall appear to the Commissioner that any part or portion of a State highway as now defined and described in this Act, is dangerous or inconvenient to the traveling public in its present location either by reason of grades, dangerous turns, or other local conditions, or that the expense to the Commonwealth in the construction, building, rebuilding, maintenance and repair thereof would be too great or unreasonable, and could be materially reduced or lessened by a divergence from the road or route, the Commissioner is hereby empowered to divert the course or direction of same and he may diverge from the line or route of same as herein described in such direction or directions as in his discretion may seem best in order to correct said danger or inconvenience or lessen the cost to the Commonwealth: Provided, that the said Commissioner shall first submit a plan of the proposed change to the Governor and the same shall be approved by him."

I fear when the day arrives when actual work begins in constructing these highways as designated by the route number, many will contain dangerous turns, too steep grades or the expense to the State in their construction will be too great, particularly to the person living some distance from the described route who, by raising a kick, would hope to have it pass by his farm or door.

This act carries with it an appropriation of three million dollars for the two years for constructing and repairing State highways, also one million dollars for building or reconstructing State aid



highways, the State paying only 50 per cent. of the cost of construction and 50 per cent. of cost of repairing State aid highways. Should the provisions of this act be fully realized and the golden period dawn of this network of roads constructed extending over the State connecting the county seats and principal cities of the Commonwealth, with all the State aid highways the total number of miles would not exceed ten thousand miles or about 10 per cent. of the public roads in the State. What of the remaining 90 per cent. of public roads? Surely the local communities will have something to do in the way of road construction for many, many years to come.

Another Act passed by the Legislature of 1911 is known as the "dirt road act," which provides that each township shall receive annually from the State fifty per centum of the total amount of road tax collected by such township, as shown by the sworn statement of the board of township supervisors, contained in the annual report furnished to the State Highway Commissioner on or before the first day of January in each year as hereinafter provided for: Provided, that no township shall receive in any one year, more than twenty dollars for each mile of township road in said township; the sum of one million dollars or so much thereof as may be necessary is hereby appropriated to carry out the provisions of this act, for the two fiscal years, beginning the first day of June, A. D., 1911. This amount was reduced by the Governor to one-half million dollars, because of insufficient State revenue. This Act, to my mind, is misleading, for the reason that it would require a much larger appropriation than one million dollars to pay the fifty per centum. In my estimation, a sum equal to the amount annually appropriated to the public schools would be more nearly the amount required. Judging from my home school district the State appropriation to schools never reaches fifty per centum of the taxes raised by the school district, and the road tax rate is never less than the school rate. No township shall receive in any one year more than twenty dollars for each mile of township road in said township. From this we infer that \$60.00 per mile is the average maximum amount to be applied or expended annually on roads. How far would sixty dollars go in permanently improving one mile of road? An average expenditure of sixty dollars per mile on all of the public roads in the State in the aggregate would amount to almost six million dollars annually and in ten years to sixty millions and no roads worthy of the name.

The good roads problem is surely a perplexing proposition. You cannot solve it without the expenditure of large sums of money; and possibly the recommendation of Governor Pennypacker that the natural resources of the State, coal and oil, be taxed to raise a fund for road making has the true ring, for we have numerous instances where persons have amassed great wealth from the development of these natural agencies and are donating of their means, large sums of money to objects wholly without the limits of the State. Had a portion of this money been expended in constructing good roads, it would have proved a lasting blessing and benefit to many of the citizens of the Commonwealth.

The subject of good roads is no longer one of their necessity; the greatest question is how to secure them.

The CHAIRMAN: Next is the Report of the Committee on Fruit and Fruit Culture, Mr. J. P. Young, Chairman.

Mr. Young thereupon read the following report.

## REPORT OF THE COMMITTEE ON FRUIT AND FRUIT CULTURE

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By J. P. YOUNG, *Chairman*

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As Chairman of your Committee on Fruit and Fruit Culture, I beg leave to report as follows:

The growing of fruit in our State has been successful as well as profitable in the past and should continue, as commercial men have found that intelligently grown Pennsylvania fruit always receives the preference of the buyers.

This is the era of the boom in fruit culture. Our State is passing through such a boom in fruit culture as never has been experienced, probably anywhere in any branch of agriculture. In this boom condition of the apple industry, there is the usual exaggeration and misrepresentation.

The many apple growing stories now going the rounds of the newspapers, showing how "John Smith grew so many barrels of apples per acre and had he sold them for so much, he would have made a fortune," make good reading for our city cousins who look enviously back at the farm, forgetting that it often includes getting up at 4 A. M. It makes very good copy for the young reporter who gets paid by the inch, but it cannot help in the end to do anything but injury to the apple industry. After reading these stories, the city consumer, on whom we must in the end depend, believes that all the producer does is to plant a few trees on some worthless piece of ground, and after a little, pick a fine lot of big red apples and send them down. He growls at the grower when he pays for the fruit, forgetting that the latter gets less than half of the money.

### PLANTING

A very great increase in planting has taken place. Without figures, it is safe to estimate that the number of trees has doubled during the last three years. We are not the only state showing such increase. It is true all over the country from the Atlantic to the Pacific. This great increase of planting has been largely in apples everywhere, although there has also been an extraordinary increase in the planting of peach and other fruits. However, it is clear that the apple will remain as always, "King of Fruits." In our neighboring states of Virginia and West Virginia, this immense rate of increase is even greater than here in Pennsylvania, while in New York and New England it is probably almost as great.

Through the kindness of Prof. J. P. Stewart, I am able to give his experience in orchard work, and he is regarded as one of the men who has left nothing undone to obtain the best results.

(1). His experience has shown that in some orchards, lack of plant food is the crop limiter. In such cases the gains from certain fertilization have run from 4-17 times the amount of fruit produced on the checks, and net profits have ranged from \$120 to \$420 per acre. Tillage and cover crops have not been the equivalent of fertilization in such orchards.

(2). That in general, the common advice to apply phosphates and potash for apples is incorrect, in the absence of nitrogen such applications, as a rule, have not paid. In its presence, however, moderate amounts of these minerals are often profitable.

Neither phosphates nor potash have had any material influence on color or size, their influence has been favorable, especially potash.

(3). Nitrogen has had greater influence in increasing yield than any other element. It also has materially decreased color. This is due primarily to delay in maturity, and may be overcome by later picking which is advantageous with such varieties as the Baldwin. The delay on it in one locality the past season was three weeks.

(4). Contrary to a prevalent notion, growth and fruiting are not antagonistic, unless either occurs in abnormal amounts. Our best growing plots, as a rule, have been our best fruiting plots.

(5). Manure has usually proved profitable, doubtless essentially because of its nitrogen contents. Whenever it has been beneficial, however, its net profits have been approached or surpassed by certain combinations of artificial fertilizers.

(6). In a few orchards, however, no form of fertilization has as yet produced material response. This we consider due to the presence of other limiters of which improper moisture supply is frequently important.

(7). The existence of such orchards emphasizes the need of local tests before making large and regular expenditures for fertilizers.

(8). In the long run, any orchard that is actively producing and growing is likely to require fertilization, since the total plant food draft of such an orchard is quite heavy, more per acre for every constituent than is required by a 25-bushel crop of wheat.

(9). Where plant food is needed, a good fertilizer is one carrying about thirty pounds actual nitrogen, fifty pounds actual phosphoric acid, and twenty-five pounds potash per acre. The nitrogen may be obtained in cover crops.

(10). Injury from fertilizer has appeared in a few cases, especially in young orchards and in connection with strong applications of muriate of potash on thin soils.

(11). Some definite correlation has appeared between certain fertilization and fire blight, the latter being worst on the manure plots and in those making strongest growth. Fruit spots also has been much worse on the manure plots in certain cases.

(12). With the four principal cultural methods tillage, tillage and cover crops, sod mulch and sod without fertilization. The second method has been best for yield and growth in a mature



orchard. With fertilization, the mulch method has excelled in both matured and young orchards, and also without fertilization in the latter, sod has given the highest color in all cases.

(13). Color is essentially dependent on maturity and sunlight, conditions increasing one or both of these factors, such as late picking, light soils, open pruning and sod culture increase color. Opposite conditions decrease it. Iron application to the soil have not been shown to improve color.

#### SIZE OF CROP

Owing to a very favorable season in part and in part to new orchards coming into bearing, this year's apple crop was probably the largest in the history of the State. The yield of peaches and other fruits, while not a record breaker, was about the average and fair prices were received.

#### PRICE OF APPLES

In contrast to the fair and satisfactory prices received by the grower for his peaches, was the exceedingly low prices offered for apples. Only fruit of exceptional quality commanded a price that would justify the grower in handling it, and undesirable varieties and other than best grade fruit in many sections hardly paid the cost of harvesting.

#### MARKETING

One noticeable feature in the marketing of this crop, was the absence of competition among the buyers. In many districts the price offered by different buyers was practically uniform, in most cases too low to be profitable to the grower. The grower had little choice, he could either sell to the buyer at the offer made or keep his fruit. Local markets were full. Unless put into storage, the fruit would rot, but when the grower applied for storage at many plants he usually found the space already engaged. Thus, little was left for him to do but to go back to the buyer and sell at the latter's own terms. Contrasted with conditions in many of the apple growing districts was the fact that any ripe eating apple was retailing in the larger cities at a price equal to the average of other years.

#### VALUE OF CROP

While there are no means at hand at this early date to state accurately the value of this year's crop, it can be very safely estimated at twice that of last year, from which the grower received little larger gross returns than last year and that he received even less net returns than for a crop half the size the year before.

One of the things lacking in fruit growing, is a better organization, not for the purpose of overcharging the consumer, but for the purpose of better distribution, as it often occurs that one market is overstocked with fruit while another is wanting a supply. This would perhaps ease the city house wife's mind, as she cannot understand why the fruit growers are not all rich when she considers the enormous price she pays for fruit.

The SECRETARY: Mr. Chairman, I notice that the report of Mr. W. Theo. Wittman, Chairman of the Committee on Poultry does not appear on the program. I am not able to say for certain whether it was in the manuscript that went to the printer, but I think it was. Mr. Wittman is an authority on poultry and I would suggest that he now be given an opportunity to read his paper.

The CHAIRMAN: We will be glad to extend this opportunity to Mr. Wittman.

MR. WITTMAN: I made just the same mistake, gentlemen, but I find in looking over the program more carefully that it is there, so I owe you all an apology.

Mr. Wittman's paper follows:

## REPORT OF THE COMMITTEE ON POULTRY

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By W. THEO. WITTMAN, *Chairman*

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Probably the most outstanding feature of the poultry situation within the State for the last year is the continued enormous increase of the amount of poultry kept by suburbanites, by villages and by city people. Practically, this is all pure bred poultry too. All of which has up to this time been reflected only in a very slight degree as regards poultry on our farms. However, already wherever there is a farm in the State that by its buildings, by its crops, and by its four-footed stock shows that its owner is progressive, there is sure to be pure-bred poultry and pure-bred poultry only. And the time is rapidly coming when at least most of the farms within the State will have reached at least that progressive stage in poultry keeping that only pure-bred flocks will be found.

Never before have the exhibits of poultry at the fall fairs been as large or so many local poultry shows been held, as this winter. Never before has the poultry press been so active; it being not unusual for one poultry paper to have hundreds and even thousands of subscribers in one county. The Philadelphia and Pittsburg Sunday papers continue to carry pages of all sorts of poultry advertising, where only a few years back they carried inches. Also farm papers, household papers and the great popular magazines even have paid much flattering attention to poultry husbandry within this last year.

Nor have as many students in any one year been enrolled as taking the poultry courses as this year at our State College. Nor has all this great increase in interest and knowledge and amount of poultry kept, as yet affected prices as some would seem to think. Or, as some would even fear, that the business be overdone. So large is the demand for fresh eggs and good table poultry, and so enormous the amount of both annually imported into the State, that it will be many years if ever that the above will come about.



What temporary slump there has been in prices in poultry meat and in eggs, was due to that the past summer was unusually favorable for the rearing of late chicks, throwing an enormous amount of killing stock on the market. And the very unusual weather conditions of December set the pullets of this late stock to laying, where usually it would have been postponed until February. In fact it set all sorts of non-winter laying fowls to laying and thus lowering the price of eggs by the unheard of increase in supply.

*Most important of all*, never before has the poultry industry included within its ranks so many earnest, intelligent and resourceful people, and the industry at large has in this country today *the largest and most active livestock organization in the world*. Pennsylvania has never before had so many organized poultry associations. One at least in nearly every county and in some counties two and three and even four. Its State organization, known as the Pennsylvania Branch, American Poultry Association, includes all the larger and most of the smaller of these organizations as members.

At their annual convention at Scranton last week, they transacted much important business looking towards the uplift of the poultry industry in this State; among other things, voting unanimously to make an effort to secure from the next Legislature an appropriation giving State College a suitable plant and equipment to teach poultry culture, and as auxilliary to this, an annual appropriation for the support of poultry shows, where people could be interested and shown directly and locally the work being done at State College. Also, an annual appropriation towards the support of a Division of Poultry Husbandry of the State Department of Agriculture, for the more direct benefit of the people at large wanting advice or aid or needing protection or regulation so that they may have actually fresh and clean eggs and clean and healthful meat.

The CHAIRMAN: You have all heard these papers read; what shall be done with them?

On motion properly seconded and duly carried in the regular way, they were ordered to be filed and published in the journal of proceedings.

The CHAIRMAN: These reports have all been presented and are now ready for discussion.

The SECRETARY: I would suggest that you postpone these discussions until we reach Number 7 of the program. Prof. Stewart is anxious to put up a screen for his report and I would suggest that we take a recess of 10 to 15 minutes to give him time to do this.

A recess was then taken.

After the recess, the meeting was again called to order by the Chairman.

The CHAIRMAN: Before we proceed with Prof. Stewart's lecture, is the Committee on Credentials read to report?

MR. GEARHART: It is.

The CHAIRMAN: We will then listen to this report now.

The Committee on Credentials made the following report:

## REPORT OF CREDENTIAL COMMITTEE

To the Pennsylvania State Board of Agriculture in session at Harrisburg, Pa., January 24th and 25th, 1912: We the Committee on Credentials appointed to examine the credentials of the various members elected, have gone over the various credentials carefully and find them in regular form, and no contests, and recommend that the following persons be admitted as members of the State Board of Agriculture of Pennsylvania:

Lycoming county, .....A. J. Kahler, .....Hughesville.  
 Sullivan county, .....J. G. Cott, .....Forksville.  
 Bedford county, .....Wm. F. Biddle, .....Everett, R. F. D.  
 Lehigh county, .....P. S. Fenstermaker, ...Allentown.  
 Huntingdon county, ....Geo. G. Hutchison, ...Warrior's Mark.  
 Centre county, .....John A. Woodward, ..Howard.  
 Northampton county, ...C. S. Messinger, .....Tatamy.  
 Juniata county, .....Matthew Rodgers, ...Mexico.  
 Elk county, .....John M. Wittman, ...St. Mary's.  
 Adams county, .....A. I. Weidner, .....Arendtsville.  
 Pike county, .....B. F. Killam, .....Paupack.  
 Chester county, .....M. E. Conard, .....Westgrove.  
 Allegheny county, .....A. J. Purdy, .....Imperial.

We also recommend the following persons to be received as delegates:

Appointed by Adams County Agricultural Society, Samuel Bream; Lebanon County Agricultural and Horticultural Association, Clark G. Long, Edward Shuey, Peter R. Boltz, Fred R. Fertig, E. S. Risser, Samuel Heilman, Edgar A. Weimer, John F. Brubaker, S. P. Heilman.

Schuylkill County Agricultural and Horticultural Society, R. H. Mengel and A. W. Berkheiser.

Juniata Agricultural Society, Stewart A. Robison, J. H. Book, J. T. Seiler.

Perry County Agricultural Society, J. B. Lair, H. B. Cumbler, M. L. Ritter.

Appointed by the Pennsylvania Beekeepers Association: Wm. A. Selser, 10 Vine St., Philadelphia; C. S. Swanson, Alternate, Philadelphia.

Also the following gentlemen:

E. M. Zerr, Garfield Egelman, Berks; Jacob Reiff, Lehigh; Mr. Chubbuck, Northumberland; B. H. Ray, Pinegrove; Dr. W. F. Vallerchamp, New Berlin.

PETER GEARHART,  
J. H. SCHULTZ,  
I. A. ESCHBACH,  
S. C. GEORGE,  
J. N. GLOVER,  
Committee on Credentials.

The CHAIRMAN: What is your pleasure with regard to this report so far as it refers to the members of the Board?

MR. J. A. HERR: I move it be adopted and these gentlemen be given the privilege of the floor.

This motion was properly seconded and duly carried in the regular way.

The CHAIRMAN: Now the delegates who have filed their credentials. What is your pleasure in regard to them?

MR. J. A. HERR: I move they be received and the gentlemen given the privilege of the floor.

This motion was properly seconded and duly carried in the regular way.

The SECRETARY: I move you that any delegates who represent any farmers organizations be admitted to seats in council with us and given the privilege of the floor, and requested to hand their names and addresses to the Secretary; that will cover every one who will come in.

This motion was properly seconded and duly carried in the regular way.

The CHAIRMAN: Mr. Creasy, that admits you.

The SECRETARY: We couldn't get along without Mr. Creasy. I heard one of the newspaper men say that it was like playing Hamlet with Hamlet left out with Mr. Creasy not here.

The CHAIRMAN: We are all brothers together and we hope you will all take part in the discussions. Anything that comes up in the line of Agriculture, let us have your views. Do not be afraid to express them. Let us do some good for the Commonwealth. Agriculture is taking on new life and it is no disgrace now to be a farmer.

The SECRETARY: Nor ever was.

MR. MCGOWAN: Before we proceed with the discussion, I wish to announce that the Committee on Legislation will meet in this room immediately after the close of this session.

MR. J. A. HERR: Since our last meeting one of our honorary officers has been called away by death. I do not know whether any of our other members have passed away or not, but I move that a Committee on Memorial be appointed.

The SECRETARY: I second that motion.

This motion was duly carried in the regular way.

The CHAIRMAN: Mr. Herr will you please pass me up the names of four gentlemen, besides yourself, to serve on that Committee? You to be Chairman.

If any member or person present knows of any members who have passed away or ex-members of the Board, or any of the specialists, you will please make it known to Brother Herr, so that a suitable minute can be made of the death.

We will now go on with Prof. Stewart's lecture.

Prof. Stewart's lecture was illustrated, and was as follows:

## THE INFLUENCE OF FERTILIZERS AND OTHER FACTORS ON YIELD, COLOR, SIZE AND GROWTH IN APPLES

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DR. J. P. STEWART, *Experimental Pomologist, State College, Pa.*

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The Pennsylvania Experiment Station has been conducting experiments bearing upon the above subject during the past five years. Altogether, it has now in operation 18 such experiments, involving soil types and 3,660 trees. In many respects, this series of experiments is by far the most comprehensive of any similar series thus far reported in America. In number of soil types; in number of treatments and checks; in number, variety and range of age of the trees; in duplications of the experiments of a given type; in the amounts of fruit involved; and in the fact that the experiments are distributed over the State and located, as a rule, in regions generally recognized as being well adapted to apple production; in all these respects we believe that the Pennsylvania orchard experiments enjoy distinct advantages over most previous efforts to answer the questions involved.

The results considered in the present paper are chiefly from 10 experiments, containing 2,219 bearing trees and involving 10 different types. The soil types range from heavy clay loams, in expt. 219, through silt and plain loams to light sandy and stony loams, in expts. 216 and 219. Some of the general features of these experiments are given in Table 1:



TABLE I. LOCATION, SOIL TYPES, VARIETIES AND TREES IN EXPERIMENTS AWAY FROM COLLEGE

Expt. No.	County	Soil	Varieties	Age 1911, yr.	No. of trees
215 <sup>1</sup>	Adams, -----	Porters loam, -----	York & Stayman, -----	12	160
216	Franklin, -----	Montalto fine sandy loam.	York & Jonathan, -----	12	160
220	Bedford, -----	DeKalb stony loam,---	York & Baldwin, -----	13 & 23	160
217	Franklin, -----	Montalto loam, -----	York & Gana, -----	18	358
218	Franklin, -----	Hagerstown clay loam,--	York & Albemarle, -----	12 & 16	400
219	Bedford, -----	Frankstown stony loam,	York, Jonathan, Ben Davis & Gana.	9	320
221	Wyoming, -----	Chenango fine sandy loam.	Spy & Baldwin, -----	39	115
336	Chester, -----	Chester loam, -----	Grimes, Smokehouse & Stayman.	9 to 11	120 & 105 <sup>2</sup>
337 <sup>3</sup>	Mercer, -----	Volusia silt loam, -----	Spy, Baldwin & Rome,---	4	180 & 180
338	Lawrence, -----	Volusia silt loam, -----	Baldwin, -----	23	80 & 105
339	Bradford, -----	Lackawanna silt loam,--	Baldwin & Fallwater,---	17	120 & 16

The first three experiments deal with the influence of fertilizers, and involve 10 treatments and 6 checks in each case. The next four experiments deal with cultural methods and involve 12 treatments in each case, except the last, which has six. The last four experiments are a combination of portions of the first two types and deal with both fertilizers and cultural methods.<sup>4</sup> As shown in the table, the trees are of 10 varieties, though with one exception there are two or more varieties in each experiment. In age at the present time, the bearing trees range from 9 to 39 years; and since the work started they have produced over 1,315,000 lb. of fruit.

In this one item of fruit, we may call attention to the facts that, so far as American experiments are concerned, this amount is more than treble that reported in any other single experiment, and very distinctly more than the total fruit reported from all other similar experiments combined. This does not mean that the importance of the experiments elsewhere is to be minimized in the least, but it should help to emphasize the fact that, in those cases where conclusions or attitudes are in conflict, very careful attention should be given to the actual and relative amounts of evidence upon which the differing attitudes are based. In fact, within our own experiments we can find the counterparts of practically all those reported elsewhere. If we had fewer experiments—for example, only one on fertilization and another on cultural methods—our conclusions could be much more easily formulated, and we might readily become ardent partisans on either side of the questions, the side depending merely upon which of the present locations our experiments chanced

1. The names and addresses of the owners of the orchards in which these experiments are located are as follows: 215, Tyson Brothers, Flora Dale, Pa.; 216, D. M. Wertz, Quincy; 220, Mrs. S. B. Brown, Manns Choice; 217, J. H. Ledy, Marion; 218, Ed. Neodemus, Waynesboro; 219, J. H. Sleek, New Paris; 221, F. H. Fassett, Meshoppen; 336, A. Darlington Strode, West Chester; 337, A. M. Keifer, Greenville; 338, J. B. Johnston, New Wilmington; 339, F. T. Mynard, New Albany.

2. In the two sets of figures in this and the following experiments, the first gives the number of trees under fertilizer experiment, the second those under differing cultural methods. In Experiment 339, the latter includes only a mulch plot.

3. Trees set out in connection with these experiments and not yet in bearing, hence excluded from consideration at this time.

4. For further details, see our Bulletin 100 and our Annual Report for 1910-11.

to have. In other words, if we attempted to base our conclusions upon any one or two of our present experiments, those conclusions would be very different from any we would now formulate, on the basis of all the results. There can be no doubt that when the whole truth is known, we shall be able to account for *all* of the facts, and this is what we are undertaking to do.

#### THE INFLUENCE OF FERTILIZATION

The first factor to which we shall give attention is that of fertilization. Can the yield, color, size and wood-growth<sup>5</sup> of apples be influenced by fertilization, and, if so, how and under what conditions? This has always been an important question, and five years ago, when we were starting our experiments, we could find no data upon which to base a definite, well-founded answer. We do not say that we can fully answer it yet, but such progress as we have made may be partially seen in Tables II and III.

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5. Quality is omitted from consideration at the present time, not because we do not consider it important, but because as yet we have no measure of quality sufficiently accurate and impersonal to enable us to make satisfactory comparisons of the fruit under different treatments.

TABLE II. INFLUENCE OF FERTILIZERS ON YIELD. (Johnston Orchard, Experiment 338).  
(Total yields of fruit on each plot and annual yield per acre.)

Plot	1 Check	2 N. P.	3 N. K.	4 Check	5 P. K.	6 N. P. K.	7 Check	8 Manure	9 Lime	10 Check
Yr.	lb.	lb.	lb.	lb.	lb.	lb.	lb.	lb.	lb.	lb.
1908,-----	90	528	237	446	57	759	211	278	558	106
1909,-----	675	6018	5257	1932	3089	6621	2008	3531	1216	1266
1910,-----	2575	8265	1822	3168	3552	2108	1629	6149	3185	3505
1911,-----	283	7563	7816	617	1227	8209	1362	4874	388	106
3 yr. totals,-----	3533	16846	14895	5717	7868	16938	4999	14554	4789	4877
Bushels per acre,-----	141.3	673.8	595.8	228.6	314.7	677.5	200.	582.1	191.5	195.

TABLE III. EFFECT OF FERTILIZERS ON YIELD. (Johnston Orchard).  
(Average returns from certain treatments during past 3 years.)

Treatment	Checks (Av. 1, 4, 7, 10)	Manure (Plot 8)	N-Fertilizer (Av. 2, 3, 6)	P. K.-Fertilizer (Plot 5)
Totals 3 yr., -----	4781 lb.	14554 lb.	16226 lb.	7868 lb.
Ratios, -----	100	304.4 100	339.4 111.5—	164.5 -----
Av. An. Yield per A.,	191.2 bu.	582 bu.	649 bu.	314.7 bu.
Av. Gain per A.,----	-----	390 bu.	457 bu.	123. bu.

These tables are from one of our "combination" experiments, involving both fertilization and cultural methods, and started in 1908. The fertilizers have, therefore, had a chance to affect the crop only during the past 3 years, and it is for that period that the totals and annual yields per acre are computed.

Even a glance at these tables can leave no doubt as to the positive and profound effect of *proper* fertilization on the yield of apples. It will be noted that the checks run fairly uniform, averaging a little over 190 bushels per acre annually. Lime applications (at the annual rate of 1,000 lb. per acre) have given almost exactly the same returns as the average check. The phosphate and potash combination has affected yield in this case rather decidedly, having raised it by 123 bushels per acre. This may be partly due to a slight superiority in location, as indicated by the fact that its adjacent check is the highest in yield and is within 88 bushels of the phosphate-potash treatment. While this increase in yield is fairly satisfactory, there is nothing in the growth or appearance of the trees of Plot 5 that would leave one to believe that their treatment is appreciably superior to that of the checks. In other words, the trees of Plot 5 still look starved and indicate that there is something else lacking, although it will be noted that this is the fertilization ordinarily recommended for orchards.

This lack is very decidedly met by the manure treatment of Plot 8. In this plot, the trees are making a luxuriant growth, both in wood and foliage, and the yields have been increased by 390 bushels per acre annually,—a very satisfactory exchange for 12 tons of stable manure. Even this increase in yield, however, is considerably less than those obtained on the plots receiving a nitrogen-carrying fertilizer. Under the latter treatment on three plots, the *average annual yield* has been increased from 191 bushels on the checks to 649 bushels on the fertilized plots, or an annual *increase* of 457 bushels of apples per acre. This resulted from fertilizer applications that actually cost less than \$17, and the essentials of which can be bought at retail for about \$10 per acre. During the past year, the fourth year of the experiment, as shown in Table II, the yield on Plots 2 and 3, compared with that of their adjacent checks, was at the rate of 17 to 1, the yield on the checks being at the rate of 54 bushels per acre, while that on the intervening nitrogen plots was 922 bus-



hels. Surely it is not necessary to further defend the proposition that proper fertilization may very profoundly affect the yield of apples.

There is no reasonable possibility of these results being due to any other agent than the fertilizers. The trees are all of the same variety and same age. They receive the same spraying, pruning, soil handling and other care. The soil is practically level and very uniform. The treatments are abundantly checked. In fruit, foliage, growth and general health of trees, the benefits stop abruptly where the fertilizers stop, and similar results are being obtained by the owner in other parts of the orchard, on the same and other varieties, with the combinations of fertilizers found effective in the experiment.

In regard to the relative values of the different fertilizer elements, it will be seen in Table II, that nitrogen is evidently the first limiter. Thus, the phosphate and potash combination in Plot 5 has given an increase of 123 bushels per acre, while by the addition of nitrogen to this combination, in the adjacent Plot 6, we get an increase of 486 bushels. In other words, the addition of nitrogen to the treatment ordinarily advised for orchards, resulted here in nearly quadrupling the benefit. In Plot 3, where the phosphates are omitted, it will also be noted that there is an annual deficit which amounts to nearly 80 bushels per acre. This doubtless indicates that phosphorus is the second limiter and that the yield in Plot 3 is being reduced by lack of this element. Potash applications, on the other hand, have been of practically no avail in this experiment. This may be seen by comparing Plots 2 and 6. The annual addition of 150 lb. of actual  $K_2O$  in the latter treatment has resulted in a gain of only 3.7 bushels of apples.

The above results were obtained without any aid from tillage or cover-crops, the fertilizers being merely sowed over the surface of untilled soil, on which there was a light sod composed chiefly of mixed grasses. Here the question may be raised as to whether equal or superior benefits may not have been obtainable with some form of cultural methods. This question is answered in Table IV.

TABLE IV. CULTURAL METHODS AND FERTILIZERS ON YIELDS  
(Johnston Orchard.)

Plot Treatment	XIII Sod	XII Sod Muleh	XI Tillage & Cover Crop	(Av. 2 & 6) N-P-Ferti- lizer
	lb.	lb.	lb.	lb.
1908, .....	1170	2265	2843	2813
1909, .....	17982	7455	10702	27649
1910, .....	2940	16789	17254	11752
1911, .....	3550	2629	7500	34502
Totals last 3 yr., .....	24472	26873	35456	73903
Ratios, .....	100.	109.8	144.8	302.
Ratios, .....		100	131.9	275.
Ratios, .....			100.	208.4
Av. An. Yield per A., 3 yr., .....	223.7 bu.	245.7 bu.	324.1 bu.	675.7 bu.
Av. Gain per A., .....		22. bu.	100. bu.	452. bu.

In this portion of the experiment, which is devoted to cultural methods, the plots are larger and contain 35 trees each. The yields of Plots 2 and 6, from the fertilizer portion, therefore, are raised to their corresponding values for plots of equivalent size. No fertilizers were used on the cultural methods plots, until the season just past. They were used then uniformly on all treatments, primarily because the sod plot had gone two years with very little fruit, though all the trees of these plots were plainly in need of something additional.

In Table IV, the sod plot shows a little higher annual yield than the average of the checks in the fertilizer portion, this being due to an exceptional crop that occurred on this plot in 1909, and from which the plot has not yet recovered. In the next plot, we see the effect of adding a mulch to the sod treatment. In this case, although all the herbage that grows is left in the orchard, and a further application of 3 tons of straw per acre is added to the plot, the average annual gain is only 22 bushels per acre. In the next plot, we find that tillage and leguminous cover crops have given a fair increase, amounting to 100 bushels per acre on the average. This, however, is hardly to be compared with the 452-bushel increase shown in the next case, which is obtained without tillage of any kind, merely by the addition of a fertilizer that carries the elements that are evidently lacking.

In some quarters one would gather the impression that apples can scarcely be grown without tillage. While we have nothing against proper tillage as an orchard treatment, yet this and other results from our experiments show that it is by no means indispensable in the production of first grade apples and that it can be readily over-emphasized like anything else. There are many situations that are otherwise very well suited for apples, where tillage is decidedly inadvisable, and where, with proper management, the trees would get along very much better without it. In such situations it is undoubtedly preferable to sow the orchard down to some leguminous crop as a permanent cover and follow the mulch system, properly supplementing it with fertilization. For this purpose, hairy vetch is doubtless preferable, on account of its relatively low moisture draft, and its usually excellent staying powers when once well seeded down. Whenever it is crowded out by the grasses, the orchard may be re-plowed and again sowed to vetch, if the trees seem to require it.

#### DATA ON FERTILIZERS FROM OTHER EXPERIMENTS

Thus far we have confined our attention to a single experiment, primarily because the contrasts in it are so great that both the existence and nature of the effects could scarcely fail to be recognized. To go through each experiment in this way would be impossible in our present space, hence we have condensed into the next two tables a statement derived from the results of six experiments, including the one just discussed. These tables show the average effects of the different fertilizer elements, obtained in six experiments, during periods covering from three to five years as indicated. The effects are calculated as closely as possible and are expressed in terms of per cents. of benefit based on the normal performance of the treated plots. The methods followed in making the

calculations are described briefly in our Bulletin 100 from the Pennsylvania Station, and described in full in our Annual Report for 1910-11.

TABLE V. EFFECT OF FERTILIZER ELEMENTS ON YIELD, COLOR, SIZE AND GROWTH

(Calculated Per cents of Benefit.)

Expts. 336, 338 & 339	Yield		Color—1909-11.	Size—1909-11	Growth—1908-11
	1908-11	1911			
	%	%	%	%	%
Nitrates in combination, .....	94.05	163.1	—13.3	—4.81	24.11
Phosphates in combination, .....	36.65	35.8	— .95	4.04	—3.97
Potash in combination, .....	—4.65	—6.42	— .1	13.2	4.17
Complete fertilizer, .....	122.5	166.4	—16.0	5.93	27.50
Manure, .....	144.1	169.8	—14.3	30.8	37.49
Lime alone, .....	19.5	—3.07	— 2.9	19.4	8.04

TABLE VI. FERTILIZER ELEMENTS ON YIELD, COLOR, SIZE AND GROWTH

(Calculated Per cents. of Benefit.)

Expts. 215, 216 & 220	Yield		Color—1908-11	Size—1908-11	Growth 1907-11
	1908-11	1911			
	%	%	%	%	%
Nitrates in combination, .....	41.7	18.05	—12.35	—1.67	14.83
Nitrates alone, .....	30.0	39.10	—16.00	—6.23	18.33
Phosphates in combination, .....	15.4	9.35	— 1.55	.925	.62
Phosphates alone, .....	— 7.4	—7.37	2.80	—1.21	.52
"Floats" alone, .....	—18.8	6.4	7.70	—1.92	—6.00
Potash in combination, .....	15.2	12.80	6.55	5.67	2.71
Complete fertilizer, .....	68.8	65.7	—16.00	4.30	19.10
Manure, .....	101.—	221.90	— 9.90	4.73	24.70
Lime alone, .....	—12.0	15.1—	.8	—1.05	3.1

In general, these tables corroborate and extend the deductions obtained from those already considered. The addition of the results from the other experiments have reduced the apparent benefits somewhat and the relative values of certain materials are also slightly changed. We have included the results of the first year in the yields of Table V, which also reduces the apparent benefits, since the fertilizers had not yet had time to operate. Even at that, however, we see that the yields during the 4-year period have been nearly doubled by the addition of nitrates, in experiments 336, 338 and 339 and with the same material they have been increased by 41 per cent. in the younger experiments of Table VI.



Phosphates, when used in combination with nitrogen or in a complete fertilizer, maintain their position as the next limiter after nitrogen, though they are closely pressed by potash in Table VI. On the other hand, neither acid phosphates nor "floats" nor lime, when used alone, have shown any consistent benefits on yield thus far. Their apparently *negative* influences on yield may be smoothed out in time, as indicated by some of the results of the past year. There is some evidence, however, that certain of these negatives really indicate a toxic action that is manifested only under certain conditions, but we have not yet carried this far enough for definite statements.

The important advantage shown by manure, especially in Table VI, is doubtless largely due to the very full crops on the manure plots of those experiments during the past year, which was rather of an off year for the similar plots receiving complete fertilizer. The better moisture-conservation under the manure and the larger amounts of plant food carried in it also probably account for a part of the superiority. In general, however, we do not find any important superiority in manure over a proper commercial fertilizer, neither in actual or net increases. Manure is undoubtedly a safe and valuable material to apply in orchards, when it can be satisfactorily obtained in sufficient amounts. But with very few exceptions, thus far in our experiments as a whole, wherever manure has given important increases, these increases have been approached or surpassed by a proper commercial fertilizer.

#### CORRELATION BETWEEN YIELD AND GROWTH

In regard to growth, it will be observed that, in general, the improvements in it have accompanied those in yield. The same materials that have improved the one have generally improved the other. In other words, as a rule, our best growing plots have been our best fruiting plots. Contrary to a prevalent notion, therefore, we may say that growth and fruiting are not necessarily antagonistic, but rather are associated, unless either should occur in abnormal amount.

#### DATA AND DEDUCTIONS ON COLOR

In regard to color, it will be observed in Tables V and VI, that none of the applications have given any important increases, and most of them have given decreases. Similar results have also been uniformly obtained elsewhere, so far as we have received the reports. The same is essentially true of applications of iron salts. From these and other considerations, therefore, we believe that color in apples can not be materially *improved* by soil applications, and that it is *primarily dependent on maturity and sunlight*.

This refers only to the red colors in apples. The yellow colors can probably not be affected by any external agency. Physiologically, the yellow color is connected with certain bodies located in the superficial layers of cells in the apple skin. It develops independent of light, and its intensity depends merely upon the degree of maturity or ripeness. The red color, on the other hand, is a constituent of the cell sap; it is capable of being influenced by a number of

agencies; and its intensity is dependent primarily upon the amount of light received during the latter stages of maturity. In other words, we get back to its dependence upon maturity and sunlight. Conditions increasing one or both of these factors, such as late picking, light soils, open pruning, and sod culture will increase color. Opposite conditions decrease it.

From this viewpoint, the reduction in color caused by the nitrates and the manure is easily explained. It is evidently due to delayed maturity. That such is the case was shown the past season, especially in the Johnston orchard, where the fruit of the nitrogen plots was left on the trees until it reached approximately the same stage of maturity as that on the checks when they had been picked. The difference in the dates of picking, which corresponded closely with the delay in maturity, was exactly 3 weeks—from September 28 to October 19. And when the final picking was done, the amount and brightness of the color on the nitrate plots was actually greater than it had been on the checks. The average increase in color on the treated plots, 2, 3 and 6, over the checks, 1, 4 and 7, was actually as great as 10.3 per cent. The great importance of maturity on the trees in increasing color is thus clearly shown.

The importance of sunlight, we had already determined in an earlier experiment. In it, we found that after the apples were picked, exposure to sunlight increased their redness by 35 per cent, while the checks in the dark and those exposed to electric light showed no definite increase.

We may also mention the facts that color may be materially affected by certain kinds of spraying and by internal variations such as appear in the solid-colored variants from the Gravenstein and 20-ounce. These points also are discussed in our Annual Report for 1910-11, but space is too limited for further consideration here.

#### RELATION OF FERTILIZATION TO SIZES

Again referring to Tables V and VI, we see that nitrates have apparently reduced the average size of the fruit. Phosphates have given only a slight benefit, if any; while potash and manure have given quite important increases. This apparent benefit from potash is interesting, and it may indicate an actual fact, since size depends upon moisture and potash has been credited physiologically with the ability of increasing the osmotic power of plant cells.

All these apparent influences on fruit-size, however, must be considered in their relation to the size of the crop on the trees. A year ago, we plotted a number of curves from data given in connection with a fertilizer experiment at the New Jersey Station, in order to determine definitely, if possible, whether any relation existed between these two factors,—fruit-size and size of the crop on the tree. We found that no correlation exists below what we may call a certain critical point, and that, under the New Jersey conditions, the number of fruits on even moderate-sized trees had to exceed about 1,400 per tree before any perceptible correlation appeared. *Above this critical point*, however, it is probable that *crop-size is the dormant influence on the size of the fruit*, though the exact position of the critical point may doubtless be raised or lowered somewhat by local conditions of moisture, plant food, etc.

In our judgment, this has a bearing upon the fact that nitrogen has apparently failed to increase the size of the fruit in our experiments. The crop-size was raised so much that full size of the fruit was not obtainable.

It also has an important bearing upon thinning. It means, in general, that if one thins an apple tree of even moderate size before the number of fruits has reached a critical point, which may be 1,400 or more, he can hardly expect to modify the size of the remaining fruit, and the most effect of the thinning will be an actual reduction in total weight of apples at least for that year. Exceptions to this may appear in varieties of extra large size, or in seasons or locations that are exceptionally dry.

It also means that, below the critical or the thinning point, there is opportunity for the other factors to exert their influence. It is here that such factors as fertilizers, cultural methods, moisture-supply, and heredity show their effects, and they may co-operate in such a way to materially raise the critical point. This assumes that the variety is properly located in respect to temperature and length of growing season, both of which are factors that may have an influence on fruit-size. We also may mention here the factors of pollination and number of seeds per fruit, which have been found to affect fruit-size by Ewert and Müller-Thurgau in Germany.

#### SUGGESTIONS ON THE USE OF FERTILIZERS IN ORCHARDS

The foregoing discussion does not mean that all fertilizers or all orchards will give a profitable response to fertilization. There are too many other limiters for that. Some of our experiments and some treatments have given no important results as yet. This may be due to improper moisture supply, relative youth of some of the trees, or to the action of some other one or more of the many possible limiters.

All the facts, therefore, emphasize the necessity for local or community trials. It is unsafe for the grower to assume either that all orchards need fertilizers or that no orchards need them. Either of these attitudes, if consistently acted upon, is almost sure to prove costly to its possessor. The only safe attitude is the one that views the orchard like other crops, knowing that lack of available food is undoubtedly the limited at times, and using proper fertilization extensively only where and when it is needed.

As to what constitutes a proper fertilizer, on the basis of present results, we are suggesting a combination that will carry about 30 pounds actual nitrogen, 50 pounds of actual phosphoric acid ( $P_2O_5$ ) and about 25 pounds of actual potash ( $K_2O$ ) per acre. Where there is evidence that potash is needed, the above amount may be increased to 50 pounds of  $K_2O$ . The former amounts are carried in 500 pounds of a 6-10-5 fertilizer, and the latter are given by the same weight of a 6-10-10 material. We apply the nitrogen by using 100 pounds of nitrate of soda and 150 pounds of dried blood, thus getting quick action and also one that is prolonged well through the season. The phosphates may be carried in 200 pounds of steamed bone meal or raw rock phosphates; or in about 350 pounds of acid phosphate or basic slag. The potash may be carried in 50 or 100 pounds of muriate



or high-grade sulphate, depending upon which of the formulas is desired, or in 100 or 200 pounds of low-grade sulphate. Upon the relative values of these latter carriers, we have very little evidences as yet.

The above amounts are intended as annual applications for bearing trees of medium age where most of the ground is to be covered. For younger trees, they may profitably be reduced, approximately in proportion to the amount of soil to be covered. On older trees or in special conditions, the combination is expected to be varied as later results direct. For example, in some instances, especially in connection with sod, we have found that the amount of nitrogen is apparently a little too low, while with tillage and leguminous cover-crops it is likely to be somewhat higher than necessary.

As to where fertilization is needed, this is more difficult to define, and probably the only certain method of determining it is by actual trial. These trials are very simple. Merely leave a typical portion of the orchard untreated, for three or more seasons, as a check on the value of treatment, and carefully mark and record the trees in at least one of the groups. There are a number of points, however, that will aid one in determining the relative size to make these groups, or in other words, aid in deciding whether to leave most of the orchard in the check or in the treated portion.

In general, for two years at least, the check should be much the larger in most young orchards or in any orchard that is doing well through late August and September. The fact that the trees are well loaded in a given year, however, is no sufficient reason for omitting the fertilizer that year. In fact, that is one of the best reasons and times for applying a proper fertilizer rather liberally, in order to prevent the total absence of a crop the following year and in the long run tend to steady the annual production.

In case of the reverse conditions—old orchards or those not retaining a thrifty look throughout the season or not growing and bearing regularly and satisfactorily—it is best to reverse the procedure and fertilize most of the orchard, leaving only a small block as a check. In all cases, however, we strongly advise the use of a check until the real value of the treatment is thoroughly established. Even then it is not desirable to omit either the check or the treatment entirely. The less valuable one may be reduced to a small space, but it should not be omitted entirely if the grower cares much for his orchard. One of our experiments, for example, showed practically no response until the fifth year, and then, when the cropping strain began to appear, quite marked differences arose in favor of the properly fertilized plots.

The time of application we also consider important, especially in the case of the nitrates. While our evidence is by no means complete on this point, yet we have some indications that nitrates applied too early in the season may be wholly lost to the trees. Other evidence leads us to believe that distinct harm may be done by making nitrate applications too near the fruit-setting time, especially in the case of peaches. We feel, therefore, that nitrates should be applied not earlier than petal-fall in apples, and probably not later than the first of July, though we have had some very good results from applications made as late as July 8. Making the applications

within this period also permits one to vary the amount applied somewhat in accordance with the amount of fruit set on the trees.

With the less soluble and slower acting minerals, the application time is less important. We know some careful observers, who regularly apply their phosphates and potash in the fall on peaches and claim that this gives the best results. Thus far we have felt that the time of application for the minerals is of relatively little importance, since they are rather quickly fixed in the soil, in any case, and they do not leach readily. We therefore apply them along with the nitrogen, at the time that we consider best for it.

The method of application that we have followed is merely to scatter the fertilizers broadcast over the surface of the ground, taking care not to get it too close to the tree trunk, where there are few absorbent roots, and extending the applications well out beyond the spread of the branches. This may either be left on the surface to be washed in by the rains or it may be lightly harrowed or plowed into the soil. With this all done, it is well to remember that the fertilizer applied in any given season can hardly affect materially the yield of that year, since the fruit buds are formed in the latter part of the preceding season. Important results, therefore, should not be expected before the following season at the earliest, and, as stated above, they may not appear until considerably later and still prove of value.

The CHAIRMAN: We now have fifteen minutes for the discussion of these valuable papers. What is your pleasure? Shall we take them up as they appear on the program, or take this particular one up? Shall we take up the paper on Fruit Culture, Road-making or Cereals? Has any one anything to say on these subjects? If so, you have the floor now. We would like you to talk to the point. We have only a few minutes for discussion. Are there any questions you want to ask Prof. Stewart in regard to these charts?

MR. MARTIN: I would like to ask the Professor if he has taken any notice of the liability of trees to be infested by insects and fungus diseases, whether they would be more exempt or more likely to be attacked?

The CHAIRMAN: The Professor has just gone out. I understand he wants to make a train. We will now take up the road question. Has any one any questions to ask Mr. Weller?

PROF. SURFACE: I should like to say a word in answer to Mr. Martin's question. I consider this to be one of the most important questions and I will therefore—Oh! I see Prof. Stewart is coming in and will let him answer it.

The CHAIRMAN: Will Mr. Martin please repeat his questions?

MR. MARTIN: Trees that have been treated, are they more resistant or more liable to insects and fungus diseases than the trees that have not been treated?

PROF. STEWART: The probabilities are that the fertilizer has no connection so far as insects are concerned. We do find, however, certain connections between certain fertilizer applications and fun-



gus diseases. For instance, this "Frog Eye" fungus that attacks the foliage in a number of cases, we have found that it helps to overcome the tendency of "Frog Eye" to defoliate the trees. It checks it, and there is enough green matter there to overcome it. Also we have observed a certain correlation between certain applications and the fruit pit which makes the brown punky spots on the fruit. We think we have had this year some rather interesting correlations between applications of manure and that. It seems to be more where the manure was, than where it was not.

MR. MARTIN: Are they more or less resistant to disease?

PROF. STEWART: They are certainly more resistant, except that in certain instances, manure seems to increase the disease. In certain cases of blister mite, they have the same relation as in the "Frog Eye," but in the case of the codling moth and things like that they are just the same as the San Jose scale. Of course the probabilities are that the tree will last longer with the fertilizer application than without them.

PROF. SURFACE: What in regard to the blight? Is it stimulated by the fertilizer—the fire blight?

PROF. STEWART: Yes, there is a pretty close relation there, but it is not perfect. We find in some of our relations decidedly more blight in the manure applications, but we must remember that under these treatments increase of growth is stimulated with the mulch and manure. This has been done in Bedford county, in Mr. Flick's orchard, in Franklin county, in Mr. Wertz's, and in some others. There seemed to be more blight after the treatment. Of course, the workmen are always liable to exaggerate more or less, but they said there was more blight in that spot than in all the rest of the orchard. It would, however, be safe to say that there was a decided relation between the two; that the weak tree is also quite subject to fire blight. I have seen weak trees almost killed by blight, where strong ones were not touched. It is the steady, slow growth on the middle ground that is resistant to blight.

MR. FENSTERMAKER: What about the blight or brown spot on the Baldwin? How do you find it there with the mulch treatment?

PROF. STEWART: Well, as I say, the only distinct relation that I have observed has been the increase that followed the application of manure in certain experiments. I do not think there is any other fertilizer treatment in which the similarity occurs, although this is a point at which we have not aimed our observations as completely as we should. I started it four years ago but gave it up the end of the second year, because I did not see any correlation, and there are so many things to take up the interest of the fruit grower.

At that time, too, Brooks had just come out with his statement that this was due to a fungus growth which was one of the very reasons I abandoned it.

MR. RODGERS: Are we to understand then that the manure causes more blight, and more brown spots than if it had not been put on?

PROF. STEWART: That is practically the case. It does not do it in the case of other treatments, but the manure seems to cause blight.

MR. MARTIN: Professor, might it not be that when the manure is applied it makes a more vigorous growth, and that that growth is more susceptible to blight than any other tree?

PROF. STEWART: Oh, yes, that is a fact, but you take a tree and feed it right, at the end of five years you will find it better than a tree that has not been fed properly.

DR. BECK: Then you think cultivation is not desirable in an orchard?

PROF. STEWART: It is of the utmost importance. But so many things enter in that it is impossible to touch them all in so short a time. I would not say that cultivation is absolutely necessary in all orchards, but there are orchards where it is proper. It is not, however, absolutely indispensable on the average orchard, because there are other ways in which you can conserve moisture and get plant food, which are the two things cultivation does. It is, therefore, of actual plant food value, as well as a moisture conservor, but you see orchards where it is better to get it from mulch; so that either matter is right in its place. In an orchard where it is all right and you prefer it, it is all right to cultivate, but you do not have to cultivate an apple orchard in order to get good returns. In other words we got four and a half times as great returns from the mulch as from the cultivation, taking it on a three year average.

MR. HOLMAN: Would you recommend it in case of a peach orchard?

PROF. STEWART: We have not tried this beyond the second year, and while we think it would be successful, I would not want to say so. Individually, there are cases where manure would not do at all in a peach orchard, and again there are cases where it would be the proper thing. It is a local matter and I would not advise a man to put manure all over his orchard until he has tried it locally. In the Niagara County Survey in New York, we find there was on an average 5,000 acres of peaches, and while I have forgotten the exact figures, on a guess I would say that about \$30.00 per acre more was obtained from the use of manure than from any other fertilizer, while the average increase of the treated orchards was something like \$46.00. However, it comes back to this point; I would not put manure on a peach orchard until I had tried it thoroughly on a small plot to see what it would do.

A Member: Would you recommend the cultivation of any orchard on a heavy limestone center?

PROF. STEWART: If you have no mulch, I believe I would sow it upon hairy vetch. Up at the College we have an orchard on heavy limestone soil, which we have sown in hairy vetch and it gives us good results.

PROF. SURFACE: What time do you sow the vetch?

PROF. STEWART: I do not believe it makes much difference, about the first or middle of July, if you precede it by cultivation; if you don't want to precede it by so much cultivation, I would say that you should sow it at any time that is good for the vetch.

PROF. SURFACE: May I ask, the brown spots on the Baldwin and Jonathan that produce the pit, are they increased by this treatment?

PROF. STEWART: Do you refer to the superficial or the interior form?

PROF. SURFACE: The puky pitting on the skin, showing in small black spots. It has not yet attacked the York Imperial so far as I know, but it shows freely in the Baldwin and Jonathan.

PROF. STEWART: Brooks, calls it the "Black Spot," and I follow his name. It produces sort of an interior punkiness, as well as attacking the skin.

It appears to be a physiological disturbance, although so far, we have not been able to throw much light on it, except the feature I have just mentioned, of the possible correlation between it and the manure applications. It seems to be due to an irregularity of the moisture supply, although I am not sure of this second point.

A Member: Is this more general on a moist soil?

PROF. STEWART: I believe you are right; and for that reason we know it to be physiological, and in some measure due to an irregular supply of moisture. Your statement is that it is more prevalent in a moist situation?

A. Member: I have a Baldwin tree right by a spring which is very badly infested; beyond it, about a hundred feet away and higher up, the trees are not affected.

The CHAIRMAN: This is an interesting subject, but the hour of noon has arrived and some of these farmers are making faces at me, showing they are hungry. If it is your pleasure we will now stand adjourned until 1.30 this afternoon.

Harrisburg, Pa., January 24, 1912, 1.30 P. M.

Mr. Hutchison in the Chair.

The CHAIRMAN: You will now please come to order. Secretary Critchfield is detained at his office for a short time, but we have three Vice-Presidents. Mr. Kahler will preside for a short time and then Mr. Gearhart will take the Chair.

Mr. Kahler took the Chair.

The CHAIRMAN: We will proceed with the consideration of the Reports of Specialists of the Board. The first number is the Report of the Botanist, Prof. Buckhout of State College.



The SECRETARY: The report is here but Prof. Buckhout is unable to be with us.

The CHAIRMAN: What shall be done with the report?

MR. HUTCHISON: I move it be received and published with the proceedings.

This motion was properly seconded and duly carried in the regular way.

Prof. Buckhout's report is as follows:

## REPORT OF THE BOTANIST

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By PROF. W. A. BUCKHOUT, *State College, Pa.*

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The correspondence during the past year has been along the usual lines and has presented but little out of the ordinary. The practical botanical questions which interest the people are chiefly seed and plant determinations and weed eradication. In the latter matter one can simply reiterate that there is ordinarily no quick, short-hand way of getting thoroughly rid of pestiferous weeds. It is simply a question of common sense methods of cultivation and general handling of the land concerned. Many are unable or unwilling to do this: hence the frequent appeal for advice.

I would again call attention to the excellent series of Farmers' Bulletins issued gratuitously by the Department of Agriculture, Washington, D. C., among which are the following which every one interested in weed destruction should procure. No. 28, "Weeds and How to Kill Them;" No. 279, "A Method of Eradicating Johnson Grass;" No. 368, "The Eradication of Bindweed or Wild Morning Glory;" No. 464, "The Eradication of Quack Grass." No spoken or written directions can take the place of these excellent bulletins.

A good illustration of the importance of correct and exact determination of seeds came to my attention by a sample of *Catalpa* seed, with the inquiry whether this was the seed of the *Catalpa* species most valuable for forestry purposes. There are three species of *Catalpa* now in common use. *Catalpa speciosa*, the most desirable, bignonioides, less so, and *Kempferi*, a small Japanese tree useful only in ornamental planting. The seeds in all three are of the same general type, but varying in size and different minor points readily detectible by one who has studied them. Since forest trees are even longer in proving their exactness of kind than are fruit trees it follows that one should be careful from the start, lest he find years afterward that he has used seed of the wrong kind. In this instance the seed was true to name and would produce the larger, straighter and longer-lived forest tree which was desired.

Inquiries regarding special crops, particularly ginseng have be-



come so frequent that a brief circular on this latter species has been prepared. Since it expresses the essential things to be borne in mind by those who are inclined to undertake ginseng cultivation it is embodied herewith:

#### GINSENG AND ITS CULTIVATION

Ginseng is a native American plant, growing wild over the eastern United States and Canada, preferably in rich, loamy soil and in woodlands throughout the Allegheny region and the northern states west of Minnesota and Missouri. It is one of about seven species native of the district above mentioned and eastern Asia.

It is an herbaceous perennial, low growing and reaching maturity only after several years of growth. It has characteristic five parted leaves, quite distinct from any other species. One familiar by practice can readily distinguish it from wild sarsaparilla or other plants commonly associated with it. The stem is insignificant and scarcely noticeable, except when bearing the cluster of bright red berries which follow the small flowers. In the fall, leaves and stems disappear, except that a short basal stem bearing one or two buds persists just beneath the surface capping the small tap root. The plant grows slowly. At the end of the third year the root, if favorably placed, may be as large as one's finger, not unlike a small parsnip, but less symmetrical and generally quite irregular and branching. This root is the usable part of the plant. It is commonly gathered for sale when several years old. The bulk of the roots of commerce are five or more years old. Collection of the wild roots which when dried meet with ready sale has long been common in the hardwood districts where the wild plants are most abundant. The high prices obtained and the fascination of hunting it have combined to diminish the natural supply and to threaten the extinction of the plant.

As explaining the great demand for ginseng roots it may be said that they have no medicinal value whatever in the estimate of American or European authorities, but from time immemorial the Chinese have held them in the highest repute and are willing to pay fabulous prices for them. For some years the export of American roots to China has been approximately 150,000 pounds per year and formerly it much exceeded this. Apparently the natural supply is being exhausted, hence the cultivation of the plant has attracted attention and much of the root now handled is thus derived. The experience of the last few years has shown that there is no inherent reason why its cultivation may not be successfully done; whether profitably is another question. There are two ways of starting a ginseng bed: by seeds, and two year old roots. In raising plants from seeds it should be noted that the seeds lose vitality very quickly on drying. Hence so soon as they are gathered they should be stratified in leaf mold. Mix the seeds with four times their bulk of leaf mold or make alternate layers of leaf mold and seeds in a wooden box, and leave out of doors over winter in some protected place. These seeds should not be disturbed until the spring of the second year, since but few seeds will germinate before they are eighteen

months old. Of course seeds may be planted as soon as they are gathered, as nature does, but the risk of loss during the dormant season is very great. Beds are more generally made by planting two year old roots. These are dibbled in like any other trans-plants and may be placed only a few inches apart. It goes without saying that whether seeds or roots are used the bed should be most carefully prepared. No success need be expected unless this is rigidly attended to. The after care must be entirely by hand-weeding and working, and presents no peculiarities worthy of special mention. Ginseng is so nearly a wild plant that careful attention to the conditions under which it naturally grows is quite necessary. It has been found that it is essential to make beds in partial shade either of surrounding large trees or of artificial frames. For obvious reasons the latter method is most feasible. A light screen of lath so as to give about one-half light is most suitable. This may be placed close to the ground or supported upon posts high enough to enable one to work under it easily. The latter is much preferable. A fence tight enough to exclude dogs, cats and domestic fowls is practically a necessity.

All these features together with the relatively high cost of the seeds or roots put ginseng in a class by itself, and make it absurd to talk about it as one would of ordinary farm and garden crops.

While, as stated, there are no inherent reasons why ginseng may not be successfully cultivated it is none the less true that there are special difficulties and diseases which must be reckoned with. The former have been, perhaps, sufficiently indicated already, the latter become more and more marked with time. This is true of all sorts of plants, none are likely to long remain immune. The principal diseases of ginseng are: (1) The wilt of old plants. This is of the same general character as the wilt of cotton, melons and other garden plants. The name expresses the character of the disease very well. (2) Wilt of seedlings. This is of the same general nature as to results, but affects the young and delicate seedlings, often spoken of as the "damping off" of seedlings. There are several causes of this malady. There is but little, if any, remedial treatment for these diseases short of starting cultivation anew with clean stock in clean soil. (3) Black rot, Soft rot, and Leaf spot fungus are likewise not seldom met with, and are difficult to control or correct. (4) Worms and insects are sometimes serious pests. The roots often show galls looking like beads on a necklace. This is caused by multitudes of small worms particularly liable to occur in rich soils. Snails and a stem boring insect larva sometimes do serious injury.

Enough has been said to show that the cultivation of this plant, while entirely feasible, is accompanied by the same class of difficulties as are the more common plants of cultivation, and is moreover of a highly special character, requiring both a special knowledge of the nature and habit of the plant itself, and, also, a most careful attention to detail methods of treatment not generally called for. Any one who desires to grow ginseng should spare no pains to inform himself thoroughly on all these points. If possible he should visit some grower and study the plant and its treatment, as well as get the owner's experience. In default of ability to do this he

should get some of the publications on the subject. The Orange Judd Co., 429 Lafayette street, New York, publish a small book for fifty cents. The various dealers and companies issue attractive and highly seductive circulars setting forth the ease of cultivation and the certainty of reaping enormous profits. A large part of the money made in ginseng comes from the sale of seeds and roots to novices who are tempted to try its cultivation. If they do not well understand the fundamental features which this paper has outlined they are doomed to disappointment and failure. The Bulletins of the U. S. Department of Agriculture and the State Experiment Stations are generally out of print, but may be found in General and Annual Reports. Two of these should be available in various public and private libraries in Pennsylvania. It is strongly advised that they be consulted. No copies are available for distribution by the Station.

- (1). Report. Pennsylvania State College, 1902-3. Page 185. "An Experiment in Ginseng Cultivation."
- (2). Report Department of Agriculture, Pennsylvania. Part I. 1897. Page 617. "The Cultivation of American Ginseng in Pennsylvania."

The CHAIRMAN: The next is the Report of Dr. Frear, the State Chemist.

The SECRETARY: Dr. Frear was in the city this morning but I think he told me that he might be called away, and in that event he would see that the report got into my hands. I therefore make a motion that it will be received and published in the journal of the proceedings, with the understanding that if Dr. Frear should come in he should be called upon to read his lecture.

This motion was properly seconded and duly carried in the regular way.

The CHAIRMAN: Next in order is the paper by Mr. J. Aldus Herr, of Lancaster, on "The Practical Side of Local Organization in Agriculture."

MR. HUTCHISON: Mr. Herr is in the city but is not in the room at present.

The CHAIRMAN: This about completes the program for this afternoon.

The SECRETARY: I would suggest that Mr. Hutchison make his report now. There is a very good audience present.

MR. HUTCHISON: I will do the best I can to make a noise. Some of us spent several days last week in the City of Pittsburg, at the big Fruit and Livestock Show. It was great. But you all know what the weather was last week, and it has left a number of us with colds.

Mr. Hutchison's report is as follows:



## REPORT OF SPECIALIST ON FEEDING STUFFS

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By GEORGE G. HUTCHISON

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To the Members of the State Board of Agriculture of Pennsylvania: As your consulting specialist on feeding stuffs, I beg leave to make the following report for 1911.

This has been a year of high prices for feeds in Pennsylvania. The one great reason was the drouth that passed over this State in the late spring and early summer, and in some sections, there was a great shrinkage in the corn and oats crops. Another reason was that in the West there were failures and a large amount of live stock was placed upon our markets and found buyers among our feeders and these had to be fed.

In regard to the law that was placed upon the statute books a few years ago, I beg leave to state that it has not been questioned on its constitutionality and in fact, we have only tried one case in court, the manufacturers and dealers having paid their fines before the Magistrate. The statement that I made in my report of last year, that all feeds should be sold on their protein and fat analysis and their low fibre constituents, or the higher the protein and fat and the lower the crude fibre, the more valuable the feed. This is the sermon the salesmen of the large feed concerns who are seeking our markets, preach in regard to their feeds, and if our feeders would study the tables furnished them, they could be just as well informed in regard to the composition and value of feeds as the salesman who sells the same.

To prove my contention, I will ask you to compare the analysis of a sample of gluten meal which analyzes as follows: Protein, 29.30%, fat, 11.30%, crude fibre, 3.30%. Sample of wheat middlings, protein, 15.60%, fat, 4.00%, crude fibre, 4.60%. Buckwheat middlings, protein, 28.90%, fat, 7.10%, crude fibre, 4.10%. Cottonseed meal, protein, 42.30%, fat, 13.10%, crude fibre, 5.60%. This is a sample in which there were no cottonseed hulls. Linseed meal, protein, 32.90%, fat, 7.10%, crude fibre, 8.90%. These are among the very high grade meals that are found on all our markets and are bought by all our feeders. These are some of the feeds that you should see that are pure and you should buy on this guarantee.

The feed question and the digestibility of feed is the one great question which our experimental stations should take up and work out for our farmers and feeders. The manufacturers and compounders of commercial feeding stuffs claim that a given amount of their feeds are digestible, but they do not give you any feeding test. What you gentlemen want is a test of these feeds on your horses for work and driving purposes, your cows for butter and milk and your other domestic animals for growth and fattening.



There are tables given of some reports, and we do not doubt their correctness, but the only true way is to feed a feed to a cow a given number of days and to keep a correct account of what she eats and what she produces in milk, if the feed is fed for milk, or if the feed is fed for butter. Give the amount she consumes and the amount she produces. This is the kind of table that will show in dollars and cents what the said feed will give in return for the money invested.

A new book on stock feeds and feedings has been published in the last year by Jas. E. Halligan, Chemist in charge of the Louisiana State Experiment Station, Baton Rouge, La., and published by the Chemical Publishing Co., of Easton, Pa. It is one of the latest and best books that has been published on this subject, and anyone who is interested in this great subject should secure this book and make a study of the question. You are the men who are paying the feed bills and you should take time to look into this question. I hereby give you a table of analysis of feeding stuffs and also the adulterants:

TABLE OF ANALYSIS

Name of Feeding Stuff	Crude Protein	Crude Fat	Crude Fiber
	Per cent.	Per cent.	Per cent.
Corn, .....	10.40	5.00	2.00
Hominy chop or feed, .....	9.80	8.30	2.80
Gluten meal, .....	29.30	14.30	3.30
Gluten feed, .....	24.00	10.60	5.30
Dried distillers' grain, largely from corn, .....	30.80	13.30	12.00
Oats, .....	11.80	5.00	9.50
Oats shorts, .....	16.00	7.10	6.10
Wheat, .....	11.90	2.10	1.80
Wheat bran, .....	15.40	4.00	9.00
Wheat middlings, .....	15.60	4.00	4.60
Wheat shorts, .....	14.90	4.50	7.40
Barley, .....	12.40	1.80	2.70
Barley meal, .....	10.50	2.20	6.50
Brewers' grain, dry, .....	26.00	5.60	1.40
Malt sprouts, .....	27.20	2.00	13.00
Rye, .....	10.60	1.70	1.70
Rye bran, .....	14.70	2.80	3.50
Buckwheat, .....	10.00	2.20	8.70
Buckwheat bran, .....	12.40	3.50	*31.90
Buckwheat middlings, .....	28.90	7.10	4.10
Buckwheat shorts, .....	27.10	7.60	8.30
Cottonseed, .....	18.40	19.90	23.20
Cottonseed meal, .....	42.30	13.10	15.60
Flaxseed, .....	22.60	33.70	7.10
Linseed meal, O. P., .....	32.90	7.90	8.90
Linseed meal, N. P., .....	33.20	8.00	9.50
Corn silage, .....	1.07	0.80	6.00
Alfalfa hay meal, .....	14.3	2.20	25.33

\*Note high per cent. †No hulls.

This table gives you the analysis of the cereals as nature produces them. It also gives you the analysis of the by-product as the chemists find them, and I hope that this table may aid you in becoming educated in regard to the feeds that go to make up the concentrated pure feeds that are on the market.

I am often asked the question, "What is the analysis of the adulterants that are mixed with the feeds that are found on our markets?"

I will give you a table of the adulterants that we have found on the markets of Pennsylvania:

Name of Adulterant	Crude Protein	Crude Fat	Crude Fiber
	Per cent.	Per cent.	Per cent.
Corn cobs, ground, -----	2.40	0.50	33-33
Oat hulls, -----	3.00	1.00	29.33
Buckwheat hulls, -----	4.60	1.10	43.30
Cottonseed hulls, -----	2.00	-----	40.00

The trade journals that are devoted to the sale of grains, flours and feeds are large advertisers of what is known as chicken wheat. This wheat is a very low grade, a large percentage of the grains are shriveled up, containing a very low percentage of starch and is almost worthless. They also buy a large amount of screenings which contain a large amount of weed seeds, but, as stated by me before in this paper, they are not selling the same in Pennsylvania, as the activity of the Department of Agriculture in enforcing the law has rid our markets of these worthless grains.

We have a large number of samples of feeding stuffs in our laboratory. I had hoped that we would be able to place our exhibit before you, but the winter fair which was held last week in Pittsburg had requested the Secretary to have this exhibit made there, and it has not been returned in time for us to make an exhibit here, but if you will call at the laboratory on the fifth floor of this building, the Chief Chemist or Assistant Chemists will gladly show you samples of feeding stuffs. Our exhibit at Pittsburg was visited by hundreds of people, and a large number of requests for Bulletin No. 208 were made. This bulletin was compiled by Mr. James W. Kellogg and great credit should be given him for the ability he has shown in this work. If it were possible for each farmer and stock feeder to have a copy of this bulletin on his table, he could be saved large sums of money in buying feeds. If you or your friends will send your names to Mr. Kellogg, he will place them on our mailing list and mail to you a copy of Bulletin No. 208. We now have a list of 6,000 names and this is increasing each year. The bulletin for the work done in the year 1911 is now being prepared and will be published in due time.

I herewith give you a table showing the work done by us in the visitation of the agents of the Department of Agriculture. You will see by this table, the agents visited a number of towns and did not obtain samples. The reason for this was that they had secured samples in neighboring towns of the same brand of feed. In 1910 we secured 1,500 samples, and in 1911, 1,000. The reason for this difference is last year our agents took a large number of samples of wheat bran and middlings. We found that the wheat brans and middlings were pure, and as the mixing of ground corn cobs with brans and middlings had ceased, and to save expense of analyzing,

we have not drawn so many samples of bran and middlings. But we do not want you to think we are not taking samples of wheat bran and wheat middlings. We take a few of each manufacturer we find on the markets, and in this way, we keep a check on what is being sold in our Commonwealth:

### TABULATED STATEMENT

<b>ADAMS—</b>			Bellewood, .....	0
Idaville, .....		1	Duncanville, .....	0
			Gaysport, .....	0
			Holidaysburg, .....	0
<b>ALLEGHENY—</b>				30
Pittsburg, .....		16	<b>BRADFORD—</b>	
Tarentum, .....		2	Troy, .....	8
Wilkinsburg, .....		8	Canton, .....	0
Homestead, .....		1	Alba, .....	0
McKeesport, .....		6	Towanda, .....	0
Carnegie, .....		6	Wysox, .....	3
Piteairn, .....		3	Ulster, .....	1
Braddock, .....		8	New Albany, .....	2
E. Pittsburg, .....		1	Monroeton, .....	1
Turtle Creek, .....		3	Sayre, .....	0
Wilmerding, .....		11	Athens, .....	0
Duquesne, .....		0	Wyalusing, .....	1
		65		25
<b>ARMSTRONG—</b>			<b>BUCKS—</b>	
Apollo, .....		4	Doylestown, .....	14
Vandergrift, .....		3	Chalfont, .....	8
Leechburg, .....		2		22
Kittanning, .....		8	<b>BUTLER—</b>	
Ford City, .....		0	Zelienople, .....	4
Freeport, .....		0	Butler, .....	9
Manorville, .....		0	Slippery Rock, .....	0
		17	Evans City, .....	0
<b>BEAVER—</b>			Harmony, .....	0
Beaver Falls, .....		5	Mars, .....	0
New Brighton, .....		5	Valencia, .....	0
Beaver, .....		1		14
W. Bridgewater, .....		3	<b>CAMBRIA—</b>	
Monaca, .....		3	Johnstown, .....	12
Freedom, .....		0	Barnesboro, .....	1
Rochester, .....		0	Carrolltown, .....	3
		17	Ebensburg, .....	1
<b>BEDFORD—</b>			Cresson, .....	4
Hopewell, .....		3	Patton, .....	4
Saxton, .....		3	Dale, .....	0
Bedford, .....		2	Conemaugh, .....	0
Everett, .....		6	Franklin, .....	0
Hyndman, .....		0	Gallitzin, .....	0
Coaldale, .....		0	Hastings, .....	0
		14	Lilly, .....	0
<b>BERKS—</b>			Portage, .....	0
Topton, .....		1	South Fork, .....	0
Barto, .....		1	Sealp Level, .....	0
Kutztown, .....		1		25
Lyons, .....		1	<b>CAMERON—</b>	
Fleetwood, .....		2	Emporium, .....	8
Leesport, .....		2	Driftwood, .....	0
Shoemakersville, .....		0		8
Hamburg, .....		1	<b>CARBON—</b>	
Womelsdorf, .....		1	Weissport, .....	0
Robesonia, .....		1	Leighton, .....	0
Wernersville, .....		1	Mauch Chunk, .....	0
Shillington, .....		1	E. Mauch Chunk, .....	1
Mohnton, .....		1		1
Birdsboro, .....		0	<b>CENTER—</b>	
Mertztown, .....		1	Phillipsburg, .....	8
Bowers, .....		1	<b>CHESTER—</b>	
Shamrock, .....		0	Downingtown, .....	4
Hancock, .....		1	West Grove, .....	3
		17	Kennett Square, .....	5
<b>BLAIR—</b>			West Chester, .....	6
Altoona, .....		23	Coatesville, .....	8
Tyrone, .....		5		
Juniata, .....		2		

## CHESTER—Continued.

Atglen, .....	3
Embreeville, .....	1
Pocopson, .....	1
Avondale, .....	0
Malvern, .....	0
Parkesburg, .....	0
Phoenixville, .....	0
<hr/>	
	31

## CLEARFIELD—

Du Bois, .....	8
Clearfield, .....	8
Coalport, .....	2
Glen Hope, .....	3
Madera, .....	1
Munson Station, .....	2
Morrisdale Mines, .....	2
Osceola Mills, .....	3
Penfield, .....	3
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	32

## CLARION—

Clarion, .....	3
E. Brady, .....	0
New Bethlehem, .....	0
<hr/>	
	3

## CLINTON—

Lock Haven, .....	7
Mill Hall, .....	0
Renovo, .....	0
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	7

## COLUMBIA—

Bloomsburg, .....	2
Berwick, .....	4
Millville, .....	3
Orangeville, .....	0
Catawissa, .....	0
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	9

## CRAWFORD—

Saegertown, .....	1
Meadville, .....	5
Linesville, .....	8
Cochrannton, .....	0
Titusville, .....	0
<hr/>	
	14

## CUMBERLAND—

Carlisle, .....	1
Mt. Holly Springs, .....	2
Boiling Springs, .....	1
Longdorf, .....	4
Newville, .....	1
Mechanicsburg, .....	4
Shippensburg, .....	2
Huntsdale, .....	0
Barnitz, .....	0
Shiremanstown, .....	0
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	15

## DAUPHIN—

Hummelstown, .....	1
Harrisburg, .....	1
Penbrook, .....	1
Dauphin, .....	0
Halifax, .....	1
Millersburg, .....	2
Elizabethville, .....	3
Lykens, .....	1
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	10

## DELAWARE—

Chester, .....	14
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## ELK—

Ridgway, .....	6
Johnsonburg, .....	3
St. Marys, .....	8
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	17

## ERIE—

Erie, .....	15
Corry, .....	12
Union City, .....	0
Belle Valley, .....	0
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	27

## FAYETTE—

Uniontown, .....	20
Brownsville, .....	2
Belleverson, .....	0
Connellsville, .....	0
Dunbar, .....	0
Fairchance, .....	0
New Haven, .....	0
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	22

## FOREST—

Tionesta, .....	3
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## HUNTINGDON—

Huntingdon, .....	6
Mapleton, .....	2
Orbisonia, .....	3
Mt. Union, .....	1
<hr/>	
	12

## INDIANA—

Blairsville, .....	6
Homer City, .....	2
Clymer, .....	1
Indiana, .....	6
Saltsburg, .....	0
Blacklick, .....	0
Crecksides, .....	0
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	15

## JEFFERSON—

Lindsey, .....	3
Reynoldsville, .....	4
Brookville, .....	4
Big Run, .....	0
Brockwayville, .....	0
Punxsutawney, .....	0
Summerville, .....	0
<hr/>	
	11

## JUNIATA—

Mifflin, .....	5
Port Royal, .....	0
<hr/>	
	5

## LACKAWANNA—

Carbondale, .....	1
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## LANCASTER—

Lancaster, .....	31
Manheim, .....	8
Lititz, .....	4
Ephrata, .....	4
Kinzer, .....	2
Elizabethtown, .....	15
Rohrerstown, .....	3
Quarryville, .....	5
New Providence, .....	2
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	74

## LAWRENCE—

New Castle, .....	12
Elwood City, .....	4
Wampum, .....	0
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	16

## LEBANON—

Lebanon, .....	9
Annville, .....	3
Palmyra, .....	13
Prescott, .....	4
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	29

## LEHIGH—

Allentown, .....	7
Bethlehem, .....	2
S. Bethlehem, .....	2
Macungie, .....	1
Orefield, .....	1
Emaus, .....	2
Alburtis, .....	0
Catasauqua, .....	0
Slatington, .....	0
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	15

## LYCOMING—

Williamsport, .....	16
Jersey Shore, .....	3
Muncy, .....	5



## LYCOMING—Continued.

Montgomery, .....	0
Montoursville, .....	0
	24
McKEAN—	
Kane, .....	3
Smethport, .....	4
Bradford, .....	11
Port Allegany, .....	1
Eldred, .....	0
Mt. Jewett, .....	0
	19
MERCER—	
Greenville, .....	6
Sharpsville, .....	1
Sharon, .....	1
Mercer, .....	0
Wheatland, .....	0
	12
MIFFLIN—	
Lewistown, .....	12
McVeytown, .....	9
Newton Hamilton, .....	0
	21
MONROE—	
Stroudsburg, .....	1
E. Stroudsburg, .....	0
	1
MONTGOMERY—	
Pennsburg, .....	1
Red Hill, .....	2
E. Greenville, .....	0
Palm, .....	0
Green Lane, .....	2
Spring Mount, .....	2
Colmar, .....	6
Lansdale, .....	13
West Point, .....	14
Hatfield, .....	13
Ambler, .....	6
Conshocken, .....	1
Souderton, .....	1
	61
NORTHAMPTON—	
Easton, .....	0
Bangor, .....	0
Nazareth, .....	0
Siegfried, .....	0
NORTHUMBERLAND—	
Sunbury, .....	15
Mt. Carmel, .....	3
Milton, .....	6
Northumberland, .....	1
Shamokin, .....	0
	25
POTTER—	
Coudersport, .....	6
Galeton, .....	0
	6
SOMERSET—	
Windber, .....	1
Somerset, .....	11
Meyersdale, .....	3
Berlin, .....	0
Rockwood, .....	0
Salisbury, .....	0
Stoyestown, .....	0
	15
SULLIVAN—	
Dushore, .....	0
SUSQUEHANNA—	
Montrose, .....	1
Hallstead, .....	0
Great Bend, .....	2
Forest City, .....	1
	4

## TIOGA—

Wellsboro, .....	8
Westfield, .....	2
Knoxville, .....	6
Blossburg, .....	0
Elkland, .....	0
Mansfield, .....	10
	16

## VENANGO—

Oil City, .....	15
Franklin, .....	6
Polk, .....	0
Siverly, .....	0
Utica, .....	0
Emlenton, .....	0
	21

## WAYNE—

Honesdale, .....	1
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## WARREN—

Warren, .....	6
Clarendon, .....	0
Sugar Grove, .....	0
Tidioute, .....	0
Youngsville, .....	0
	6

## WASHINGTON—

Charleroi, .....	5
Monongahela, .....	6
Washington, .....	15
Canonsburg, .....	8
California, .....	0
Roscoe, .....	0
	31

## WESTMORELAND—

Larrobe, .....	4
Greensburg, .....	10
New Stanton, .....	2
Mt. Pleasant, .....	6
Scottdale, .....	5
Belleverson, .....	2
Avonmore, .....	1
Parnassus, .....	5
Irwin, .....	3
Manor, .....	3
Derry, .....	6
Jeannette, .....	8
Arnold, .....	0
Bolivar, .....	0
Livermore, .....	0
Monessen, .....	0
N. Belleverson, .....	0
	55

## WYOMING—

Laceyville, .....	3
Meshoppen, .....	1
Mehoopany, .....	0
Tunkhannock, .....	0
	4

## YORK—

York, .....	23
Spring Forge, .....	2
Dillsburg, .....	1
Glen Rock, .....	1
Wrightsville, .....	1
Hanover, .....	1
Dallastown, .....	0
Red Lion, .....	0
	9

Number of counties visited, .....	56
Number of town visited, .....	327
Number of samples taken, .....	1,000

The number of samples sent into the laboratory by citizens of Pennsylvania was two hundred. This has been a great source of furnishing information to the dealers and buyers of feeds. Anyone who may want to have a sample of feed analyzed can have the analysis made by forwarding the same together with fee of one dollar to the Chief Chemist. A number of persons who are purchasing high concentrated feeds such as cottonseed meal, linseed meal and gluten feed which were bought on a guarantee for protein and fat and low fibre, have sent in samples and had them analyzed, to keep a check on the firms that were selling these high priced feeds. This is a capital way for men to know what they are buying. A carload of feed to-day amounts to between five and six hundred dollars, and by the investment of one dollar, the purchasers can know whether they are receiving true values or not; but so very few take advantage of this splendid clause in the law.

The Secretary of Agriculture, Hon. N. B. Critchfield, ordered prosecution last year in forty cases. Conviction was secured in thirty-nine of these cases. One case has been appealed to court and will be tried in due time. In 1910 there were sixty cases prosecuted. This shows a decrease of twenty cases. This is a chart to show that the feed conditions under our law are improving.

I am going to digress a little and call your attention to a table that has been placed in my hands a few days ago by a friend and incorporated as a portion of this report:

# COMPARATIVE AGRICULTURAL STATISTICS, STAPLE FARM CROPS FOR THE YEAR 1911.

COMPILED FROM STATISTICS PUBLISHED BY UNITED STATES DEPARTMENT OF AGRICULTURE, BUREAU OF STATISTICS

COMMODITY	TERRITORY	Total acreage	Average yield per acre	Total production	Average farm price	Total farm crop value
BARLEY—Bushels, -----	UNITED STATES, -----	7,627,000	21.0	160,240,000	\$8 86.9	\$139,152,000
BUCKWHEAT—Bushels, -----	PENNSYLVANIA, -----	7,000	25.0	175,000	65	114,000
CORN (Shelled)—Bushels, -----	UNITED STATES, -----	833,000	21.1	17,549,000	72.6	12,735,000
HAY—Tons, -----	PENNSYLVANIA, -----	231,000	21.9	6,373,000	69	4,397,000
OATS—Bushels, -----	UNITED STATES, -----	105,825,000	23.9	2,531,483,000	61.8	1,565,253,000
POTATOES—Bushels, -----	PENNSYLVANIA, -----	1,435,000	44.5	63,858,000	68	43,423,000
RYE—Bushels, -----	UNITED STATES, -----	43,017,000	1.10	47,444,000	\$14 64	694,570,000
TOBACCO (Leaf)—Pounds, -----	PENNSYLVANIA, -----	3,148,000	1.00	3,148,000	\$20 00	62,960,000
WHEAT (Winter)—Bushels, -----	UNITED STATES, -----	37,763,000	24.4	922,298,000	45	414,663,000
TOTALS, -----	PENNSYLVANIA, -----	1,121,000	28.3	31,724,000	50	15,862,000
PERCENTAGE, -----	UNITED STATES, -----	3,619,000	80.9	292,737,000	79.9	233,778,000
	PENNSYLVANIA, -----	2,700,000	56.0	15,120,000	98	14,062,000
	UNITED STATES, -----	2,037,000	15.9	33,119,000	83.2	27,557,000
	PENNSYLVANIA, -----	285,000	15.1	4,304,000	80	3,443,000
	UNITED STATES, -----	1,012,800	893.7	905,109,000	9.4	85,210,337
	PENNSYLVANIA, -----	46,000	1420.	65,320,000	9.5	6,205,400
	UNITED STATES, -----	29,162,000	14.8	430,656,000	88	370,151,000
	PENNSYLVANIA, -----	1,259,000	13.5	17,402,000	92	16,010,000
	UNITED STATES, -----	230,955,800	Yield Va	due per acre, ---	\$15 38	\$3,552,104,387
	PENNSYLVANIA, -----	7,892,000	Yield Va	due per acre, ---	\$21 09	166,476,400
	PENNSYLVANIA, -----	3.417%	-----	-----	-----	4.687%

NOTE.—No report on Acreage, Production, &c., is made by the Bureau of Statistics on Apples, Grapes, Pears, Peaches or Sweet Potatoes nor on Spring as distinguished from Winter Rye—both are combined. The figures on "Winter Wheat," for Pennsylvania, embody all Wheat raised in the State, comparatively, little Spring Wheat being produced. (Compiled by William J. Rose, Freight Agent, P. R. R.)

I have been asked by a number of my friends and fellow-farmers, What have you new to present to the Board this year on the feed question? This is a hard question to answer, as this has been a year where a majority of the large firms and manufacturers shipping feeds into Pennsylvania have put forth their best efforts to comply with our law. The weed seed question has been the one that has given us the most trouble. A number of manufacturers who placed weed seeds in their molasses feed have removed the same. We waged a strenuous warfare on the manufacturers of chicken feeds. They were placing on our markets a chicken feed that contains a large amount of whole weed seeds. This was contrary to our law. The Secretary ordered prosecution and we secured conviction in all cases.

I present to you a sample of a certain chicken feed which has a large sale in our markets and which contained large quantities of weed seeds. I present to you a second sample that we found was composed of good cereals. This is a good lesson and will show you what good effect our law is when properly enforced. We find that the great trouble has been in the past with our own people. They do not take time to look into these subjects, and in place of buying good red wheat, good clean oats, buckwheat and corn to feed their chickens, which they can buy at a fair market value, they will go to the store and buy a feed that has been compounded or mixed by some firm in the far West and pay a price ranging from two to two and one-half cents a pound or from forty to fifty dollars per ton.

Here is what a member of the Board of Trade of St. Louis says in regard to these persons who come to attend the Board and buy grains to compound chicken feeds: "There are a dozen buyers there every day for chicken feed, wheat, corn and oats so badly damaged they cannot use it for any other purpose."

Pennsylvania is a great agricultural state and has great possibilities, if she could have her sons and daughters engaged in agricultural pursuits; but they go to towns and cities to make their fortunes and leave the old farm. How many of them succeed we cannot tell, nor can we tell how many fail, but in our visit to Pittsburg last week, the cry of the rich was to return to the farm, and if our young people could understand the conditions that exist in the cities, this table might be of some benefit to them. If you will take the time to read this table when this report is published, you will find that it contains some very encouraging data in regard to the average production of Pennsylvania. I would call your attention to a few of the cereals:

We will take barley. We find that the average production in the United States is 21 bushels, and that Pennsylvania produces 25 bushels, or an increase of four bushels.

Shelled corn, United States, 23.9 bushels; Pennsylvania, 44.5 bushels. Oats, United States, 24.4 bushels; Pennsylvania, 28.3 bushels. (Leaf) Tobacco, United States, 893.7 pounds per acre; Pennsylvania, 1,420 pounds per acre. In summing up the value per acre of barley, buckwheat, corn, hay, oats, potatoes, tobacco and wheat, we find the average money value per acre in the United



States is \$15.38, in Pennsylvania, \$21.09, or \$4.29 in favor of Pennsylvania. This does not give the value of the apples, grapes, pears, peaches or sweet potatoes.

Before closing this report, I would like to call the farmers' attention to the importance of the calf meals that are being compounded and are upon our markets. These are high protein and fat and low fibre meals, and if they are fed according to the directions, you will have no trouble in raising your calves on your farms without the use of a small amount of milk, and after they get to be two months old, you can dispense with the milk and raise them on the meal. These feeds will grow the calf and develop its structural formation. I have had experience in growing calves at home with these meals. They are also splendid to feed to young pigs when you have a scarcity of milk, or to mix with milk. The price of one of them is high, but the other two meals sell at a fair price. I am here to advertise any special brand of calf meals, but I am here to try to encourage the dairymen to raise their heifer calves and by so doing, to increase the number of dairy cows in Pennsylvania.

It is a sad sight to see so many good heifer calves taken for vealing purposes, when they might produce some of the very best dairy cows and in this way increase the supply of butter and milk in our Commonwealth.

I wish to thank the Secretary of Agriculture, Hon. N. B. Critchfield, for his kindness and courtesy to me in my work as his General Agent.

I also wish to return thanks to Mr. James W. Kellogg for the many courtesies he has extended to me during the past year and for the friendly and courteous manner in which we have worked as co-laborers.

I also wish to thank Mr. John F. St. Clair and Mr. W. John Stiteler, Special Agents, for the able manner in which they have discharged their duties.

I also wish to thank Mr. John Spicer for the able manner in which he prepared our exhibit and the courtesies that he extended to the farmers who came to examine the same.

The CHAIRMAN: What is the pleasure of the Board? What shall be done with this report?

The SECRETARY: I move it be received and published in the report of the proceedings.

This motion was properly seconded and duly carried in the regular way.

The CHAIRMAN: Has any of the other gentlemen come in? I see that Mr. Herr has. Mr. J. Aldus Herr of Lancaster will now tell us about "The Practical Side of Local Organization in Agriculture."

Mr. Herr read the following paper:

## THE PRACTICAL SIDE OF LOCAL ORGANIZATION IN AGRICULTURE

By J. ALDUS HERR, *Lancaster, Pa.*

This much talked of topic has received more attention the last year than at any previous time, and in many instances has resulted in much good to the producer as well as the consumer.

Organizations are of early origin, but most of these pertaining to the uplifting of farm life have chiefly been along the social side, and the practical part has partially been neglected. Organizations of this kind are designed to further their interests and particularly bring the producer and consumer, the farmer and manufacturer into direct commercial relations without the intervention of the middlemen.

Nearly all industries have established organizations for the betterment of their interests, even in the conservative County of Lancaster. We have two agricultural clubs that have been in existence for many years: namely, the "Octoraro Farmers" and the "Fulton Farm Club," I have read the report of these meetings when the writer was a mere boy. Then came the Lancaster County Agricultural Society, this was followed by the Grange, and more than a half dozen similar organizations pertaining to farm life, all doing work along their respective lines. But their advancement has been chiefly social instead of dealing with the more practical side of their occupation.

The question which confronts most of us is, How can we combine the two with better advantage to the majority of persons interested?

The two chief interests confronting the farmer today are more economical production, and better distribution of marketing.

Too many of the crops on the farm are produced at an actual loss, or probably just sufficient profit to maintain the industry. Following this is the finding of the best markets for the products, too often there are instances where some markets are glutted at the expense of other poorly furnished ones.

These are the two chief interests that have been neglected in most farm organizations, except a few large companies who have tried to solve the problem with some degree of success, but often being too large, and beyond the control of the producer and consumer alike.

The State and National Grange have done much good in general, but in our county it has been a dismal failure, few persons knowing there is one in existence. About twenty years ago there was a local Grange in our community, but it long since has gone the way of many other good organizations for want of actual effort. The social side was a glowing success, but the business and financial part was sadly neglected, thus the result mentioned.

Now how best to overcome these serious failures is the question to solve. The very nature of the farmers' calling should induce him to organize locally for the purpose of selling the crops he produces, and buying the articles he must have in his business, and to learn to deal more direct with the consumer and producer; thus to eliminate to a certain extent the middlemen who have been a very costly adjunct in the business life of the American Farmer.

The farmer of the future must be more of a reader and thinker for his own benefit. The more direct he deals with the consumer and producer the more intelligence he must put in his business.

After having produced a valuable crop, it requires some business and executive ability to put his products before the purchaser in the most attractive appearance with a profit to himself, as well as a reasonable price to the consumer. Not forgetting the fact that a pleased and satisfied customer is the best "ad" in any line of business and much cheaper, and more durable than printers' ink. The time has never existed when there was an over-production of a good, first-class article, if properly distributed, and goods of this class always demand a paying price, and in many instances the purchaser will look up the producer who has goods of this class for sale.

We as farmers should think more of the consumers' wants and desires, who are willing to pay good value for goods received, if in so doing they actually receive full value for what they pay. We should take a full broad view of the business relations between the producer and consumer.

The more familiar the farmer is with the life of the consumer and *vice versa*, the more satisfactory it will be for all concerned. Invite the consumer to come and see the plant where the articles offered for sale are produced, by so doing you would receive the confidence and advertising medium of a good customer, which is a long step in the line of success.

The origin of all Government is the home. The basis of all large organizations must be of local origin; no wheel is stronger than the weakest cog within its circle.

The foundation for a business organization must be laid by the members within reasonable bounds of their local community.

No one is more capable of knowing the wants and desires of a community than the residents thereof, and they should be more efficient in the management of said local organization. Whenever a company expands beyond a certain limit it becomes unwieldy and throws itself liable to many dangers which are detrimental to the control and a menace to the best development along the line of business intended. Self-government, which begins at home, is also appreciable in local organizations, and in a very great degree, means nothing more than good common sense, which is frequently lacking in many business propositions.

The country at large today is more aroused about the organization of the farmer than it has ever been before. Most dailies, and many of the most prominent magazines give considerable space to the discussion of this most worthy subject.

The place to foster this worthy child of the "Farm Organization" I believe must be in the public schools. The child who will make the successful farmer of the future must be better equipped to



deal with the problems that will confront him. He must see farm life from a higher and different aspect than he has ever seen it before. The day is at hand when the manual training system of education must be the prevailing school established for the rural as well as the city districts.

The ever pressing demand for education that will train the child to be a self-sustaining bread winner, will be the power; and when started right, it will control the best interests in the United States. Then, and not till then, will the farmer receive his just demands, and the now dominating powers will give recognition when asked for, or be trodden on by the onward move of justice.

As far as farm organization has gone, it is a step in advance of education. The rural schools as well as those of the city should become a unit of power in the betterment for agricultural uplift, for the destiny of both classes is dependent upon the success of agriculture.

All other industries are at the mercy of the great calling, tilling the soil. The issue of the day is better government for local organizations. Local farm organizations have been started in many places and have proven beneficial; with few exceptions the farmer has not received his portion of the dollar in the disposal of his products, as yet these organizations have more efficient buyers than sellers. The most direct road to dispense with the middlemen's profit, is through more direct buying from the manufacturers, this end of the problem has been fairly well solved.

The Lancaster County Farmers' Association which we started five years ago, was of very humble origin, the first season ending in 1911. They did a business of \$122,000.00, paid 5% on the capital stock and conducted the business on a 2½% basis. They have capitalized at \$75,000.00 and have 1,000 members in good standing.

A very important feature of this organization is that all business is done on a cash basis. It is the duty of the General Manager to receive prices on all lines of goods to be purchased. If any member refuses to pay cash, he is denied the privileges of the association and cannot deal with it.

This organization has a main office, with four branches, its 1,000 members ordering all goods through the General Manager; but each branch is responsible for its own indebtedness and should any of the branches fail it cannot in any way affect any of the other branches.

At present two of the branches here built substantial brick buildings for stores, costing about \$4,000 each, the two branches carrying about \$18,000.00 worth of goods needed on the farm, coal, feed, flour, seeds, oils, implements and farm machinery in general. You can buy nearly everything needed on the farm from a tack to a four-horse wagon. As mentioned before, the way to eliminate the middlemen is by direct selling to the consumer. If the members of an organization, like the one in Lancaster county, would unite in disposing of their crops in carloads, having some responsible man to whom to ship to regularly, it certainly would be of immense benefit to the producer.



The thousand members could create a demand for first-class products, and to a great extent, solve the problem of dividing the dollar between the producer and consumer, without the assistance of the much talked of middlemen.

But in selling direct as well as purchasing there are many problems of importance to be met, and right here is where the public schools are deficient in not giving the pupils an education on a more substantial bread-winning basis. Had the new school code of Pennsylvania given us this much needed training for the men and women of the future, we might excuse the remainder of that voluminous document.

In direct selling, there must be a confidence established between the seller and purchaser, of the highest standing; and great care should be taken that this confidence should never be misplaced.

Oh! hail the day, for it is near at hand, when the onward movement of Local Farm Organization will be heard all along the land, and the elements of resistance that are defying our advance, will listen and take warning, when many of the shackles will be cast asunder.

Then, and not till then, will the farmer receive to a large degree the profits of his toil.

The CHAIRMAN: What shall be done with this paper?

GEN. BEAVER: I move it be received and published with the proceedings.

This motion was properly seconded.

MR. BAYARD: Mr. Chairman, I would make a suggestion. This paper will be published; and I think the Constitution and By-Laws of this Lancaster County Co-operation concern should accompany it. I have had this paper written up, as I have also done with some others, and in every case a number of inquiries followed for more detailed information, so I think it would be a good idea to publish all this information with the paper.

MR. FENSTERMAKER: Would it not be well to have it put in pamphlet form? It takes so long to get out these reports. Let us do some good work while we are at it.

The SECRETARY: I think it will be well to have a little discussion on this subject. It is a very important subject. Mr. Herr is here, and he is of age and able to talk for himself. If some one will simply make a motion that the Articles of Incorporation be embodied in the paper, and the paper thus published, I will see that it is done.

GEN. BEAVER: I move this paper be received and published.

MR. FENSTERMAKER: I second that motion.

The CHAIRMAN: Any questions?

MR. MARTIN: Two and one-half per cent. pays all the expense of conducting the business. Please explain how that works?

MR. J. ALDUS HERR: As I understand Mr. Martin's question in reference to the  $2\frac{1}{2}$  per cent., Mr. Chairman—we have a General Manager, if that is what you want to know about our organization, and he is paid  $2\frac{1}{2}$  per cent. on all the goods handled. Now, he is supposed to pay—suppose we have four or five carloads of coal, and a couple of carloads of bran, and he has to get a couple of extra hands in to unload it, out of his  $2\frac{1}{2}$  per cent. he pays their expenses. But at West Willow we also have a store manager and he is also paid  $2\frac{1}{2}$  per cent. Then in addition to the  $2\frac{1}{2}$  per cent. paid the manager, the business is also supposed to give us a dividend of 5 per cent. on the Capital Stock. So far the  $2\frac{1}{2}$  per cent. has paid all our expenses, and added something to our Sinking Fund besides.

A Member: Do you confine the benefits to the membership list.

MR. J. ALDUS HERR: No sir; besides the voting members who pay a dollar a year, we have contributing members at fifty cents, and these contributing members have the same benefits as I have, except that they cast no votes. Some of our members are day laborers, many of our men employ labor by the year and they know at the end of the year how much money they will have if they have no sickness. It is a matter of cash with these men. If a man wants to buy a hundred pounds sack of bran, he can buy it at the same rate that I can buy a carload, if he pays his fifty cents a year.

MR. SHOEMAKER: Suppose there is a loss, who pays that?

MR. J. ALDUS HERR: We have a fund for that purpose, which has been created out of our  $2\frac{1}{2}$  per cent. Our main office is at Mechanicsville; besides this we have two warehouses, one at Quarryville and one at West Willow, and if you ever come to Mechanicsville, you can see the difference between the way our business is carried on, and the way business is usually conducted.

MR. STOUT: Is the manager paid a salary over the  $2\frac{1}{2}$  per cent?

MR. J. ALDUS HERR: No sir; that pays everything, and out of it we also paid the other warehouses, and have a sinking fund, besides \$18,000 worth of goods in stock.

A Member: Do you also sell good butter?

MR. J. ALDUS HERR: No sir; but we make all we can eat. We started in with eighteen members, five years ago, and have now a thousand in good standing.

MR. SHOEMAKER: Do you have trouble in buying from the Commissioners?

MR. J. ALDUS HERR: They tried to boycott us, but when we shove the cash under a man's nose, he cannot very well refuse it. It starts him thinking.

MR. HOLMAN: I cannot thoroughly understand where the  $2\frac{1}{2}$  per cent. comes in?

MR. J. ALDUS HERR: Well, suppose we buy a ton of bran for \$20.00, we add enough to pay the  $2\frac{1}{2}$  per cent. salary and the 5 per cent. dividend.

The SECRETARY: You add  $7\frac{1}{2}$  per cent?

MR. J. ALDUS HERR: Yes, sir.

MR. GEARHART: Do you pay him a flat  $2\frac{1}{2}$  per cent., or do you pay a salary out of it?

MR. J. ALDUS HERR: We pay a flat  $2\frac{1}{2}$  per cent.

MR. RODGERS: You can pay him as the goods are sold?

MR. J. ALDUS HERR: Certainly, the \$18,000 worth of goods in stock, he has not yet got his commission.

A Member: What is the amount of business you did last year?

MR. J. ALDUS HERR: About \$122,000.00—a trifle over. Now we began at West Willow a little over a year ago, and until the third of this January, we had done \$41,000.00 worth of business.

MR. SHOEMAKER: What is the percentage of loss?

MR. J. ALDUS HERR: I cannot tell you; I am not the manager. I am only a stockholder, and take an interest in the organization.

A Member: Do you handle binders?

MR. J. ALDUS HERR: Yes; what can you buy a binder for?

A Member: One hundred and fifteen dollars.

A Member: One hundred and twenty dollars.

MR. J. ALDUS HERR: I can save you fifteen to twenty dollars on that.

A Member: Do you handle more than one make of binder?

MR. J. ALDUS HERR: No, sir.

A Member: If you pay cash where do your losses come in?

MR. J. ALDUS HERR: Depreciation, etc. This year we put in a bid for our township schools' coal, and we put it in at fifty cents a ton lower than any one else offered to do, and paid all our bills.

A Member: Does he sell it the same as the trade?

MR. J. ALDUS HERR: Oh, no. Say bran is worth twenty dollars a ton at cost, and at the outside our price will be twenty-one dollars.

MR. HOLMAN: For instance, you buy a hundred dollars worth of goods and you add about eight dollars to it to pay the 5 per cent. for your dividend and the  $2\frac{1}{2}$  per cent. commission?

MR. J. ALDUS HERR: In that neighborhood.

PROF. MENGES: You capital stock is not as large as the amount of business you do, therefore that dividend of 5 per cent. on the amount of business you do is paid simply on the amount of stock subscribed?

MR. J. ALDUS HERR: Oh, no. Our capital stock is not as large as our business, and we pay the 5 per cent. dividend only on the stock paid in.

MR. SHOEMAKER: Then the manager in marking the goods, takes the market cost and adds to it the  $2\frac{1}{2}$  per cent. commission and then a little more to pay the dividend?

MR. J. ALDUS HERR: And to cover depreciation; there are always shrinkages.

A Member: If you buy futures like feed this fall; is that sold at a  $2\frac{1}{2}$  per cent. advance?

MR. J. ALDUS HERR: I think so; I am not sure, and I want to be a little careful what I say. I am only a member of the Board. But to the cost of handling there is added first the 5 per cent. for the dividend on the capital stock, and then the  $2\frac{1}{2}$  per cent. for the manager, and probably a little more for incidental expenses.

MR. STOUT: Don't these coal corporations refuse to sell you at this price?

MR. J. ALDUS HERR: Suppose they do? We can always get the coal elsewhere. Some of the feed people started in to boycott us, but others came along and offered to sell us because we offered cash. I know that in one case last fall we had a binder for \$120.00 and a few days ago a gentlemen came along and offered me a binder for \$100.00, of course I could not take it, because it would not have been good faith.

A Member: Do you handle more than one make of binder and implement?

MR. J. ALDUS HERR: I cannot answer that; we handle different kinds of implements, but I think we handle only one binder.

A Member: What kind?

MR. J. ALDUS HERR: Wood.

MR. HUTCHISON: That is not in the Trust.

MR. J. ALDUS HERR: No; neither are we.

MR. SCHULTZ: I think the last word he said was wrong. I think they are "trusting" themselves.

The SECRETARY: I think that is all right. He said "The Trust;" that is "A Trust."

MR. J. ALDUS HERR: Now, Mr. Chairman I was just going to offer a resolution, if it is proper at this time.

The CHAIRMAN: The first question is on the adoption of the paper.



MR. GEARHART: If it is in order, I move that the paper be received with the Constitution and By-Laws, and such information as the Association will give to the public, and the Department be requested to have it published in pamphlet form for the benefit of the farmers of Pennsylvania.

GEN. BEAVER: This is an amendment to the original motion, and I accept it as such.

This motion was properly seconded and duly carried in the regular way.

The CHAIRMAN: Now Mr. Herr's resolution is in order.

Mr. J. Aldus Herr offered the following resolution:

*Resolved*, That a committee of seven be appointed to inquire into and report at our next semi-annual meeting upon the appropriations needed to carry on the development of the agriculture of the State, and to co-operate with the Department of Agriculture in securing such appropriations from the next General Assembly.

On motion, properly seconded and duly carried in the regular way, this resolution was adopted.

The CHAIRMAN: This Committee will be appointed later on in the meeting.

The SECRETARY: There is nothing special before the Board just now. There is, however, one distinct characteristic of the citizens of Pennsylvania, and that is, that they cannot stay away from Pennsylvania. We have with us this afternoon a former Pennsylvanian, a distinguished worker in the field of Agriculture, one who was with us in the field some years ago. I refer to Prof. John Hamilton, of the United States Department of Agriculture. We shall be very glad to hear from him.

Prof. Hamilton took the floor, and addressed the meeting as follows:

#### ADDRESS OF PROFESSOR HAMILTON

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It is needless to say that I am always glad to get back to Pennsylvania—particularly when it gives me the privilege of looking into the faces of the men of this Board whom I have long known, and honored for their substantial work in the interest of agriculture.

In thinking of the Board and its services to the State, I feel that some one should be deputized by the Secretary of Agriculture to write its history, not simply a history of the Board as a whole, but of its individual members.

The SECRETARY: I have been trying to get it done, but so far the Nestor has refused to be pressed into the work.

PROFESSOR HAMILTON: I think it should be done. I have been thinking while sitting here, "What if the State of Pennsylvania were to employ this body of men by the year to give their entire time and attention to the development of agriculture in their respective sections?" If so much has been done by these men, meeting three or four days in the year, what would be the result if they were to devote all of their time to the development of agriculture? I believe we have come to a time when in every state a body of experts to assist agricultural people at their homes will be employed by the year. It is coming to this that in every county in every state of this Union in which farming is an important feature there is going to be an expert giving all of his time and attention to the development of agriculture.

In the stronger agricultural counties, as Lancaster and Chester, there will be six, eight, or ten men who will do nothing else but attend to the development of their agriculture, and I may add, domestic science as well. These men will be responsible to some central agent or head, such as the State Board of Agriculture or the State Agricultural College.

There is a notable instance of the effect of that method that has just been brought to the attention of the world by the publication, in French, of the condition of agriculture in Belgium. Belgium in its political divisions is something like Pennsylvania. It is divided into Provinces similar to our counties; its population is about equal to that of Pennsylvania, numbering about seven millions, of whom about one million are farmers. Its area, however, does not compare with that of Pennsylvania. In size it is about equal to the State of Delaware.

Twenty-five years ago agriculture in Belgium was in a condition so depressed that the livelihood of the people were seriously threatened. It became necessary to do something for its development. Their wise men got together and after considering the situation at home and looking at agriculture as pursued in different other countries, adopted a plan that has proved to be marvelously successful. They did not begin with four or five experiments, but selected one and carried it on for 25 years. It consisted in the creation of an office called "Agricultural Supervisor." This supervisor was placed over the entire Kingdom. The country was divided into three divisions, and an agricultural expert was placed in each of these divisions. Later they appointed an expert for each Province. Each of these men was required to give his entire time and attention to the development of agriculture in his District. No one could be appointed to the position who did not possess a certificate as Agricultural Engineer, except an occasional man who had been conspicuous for his success along some line of agriculture, and he only after he had passed an examination before an expert board. The results have just been published and we have had the report translated in our office.

There are today thirty-two of these experts in charge of agriculture in the various provinces. As a result in the Province of Antwerp, arable land was raised in 25 years from \$105 per acre to \$162. Prairie land from \$146 to \$243; heath land that was pretty nearly

valueless, went up from \$4.00 to \$16.00; sandy land was raised from \$160 to \$225. In East Flanders the best land was raised from \$243 to \$405,—an increase of \$160 per acre.

Similar advance was made in value in every variety and character of soil, sandy, peat, bog and other kinds. There was nothing done by the State for the improvement of her agriculture but that one thing,—simply putting one or two experts into each Province to show the people the most advanced methods of agriculture.

We heard in Mr. Hutchison's paper, something about the amount of wheat grown in Pennsylvania. Here is what they did in Belgium. At the time the experiment began in 1885, they were producing in Antwerp an average of 23.75 bushels of wheat per acre; in 1910, it was 31 bushels, an increase of 7.30 bushels per acre. The yield of rye in 1885 was 23.45 bushels per acre; in 1910, it was 31.07 bushels; an increase of 7.62 bushels. Potatoes, 207 bushels per acre in 1885, as against 294 bushels in 1910,—an increase of about 87 bushels per acre. The increase for the Province of Brabant was wheat, 14.73 per acre; rye, 19.44 per acre; barley, 36.62 per acre. In beets they raised the percentage of sugar from 11 to 16 per cent. The increase in wheat for the whole country was from 24.53 to 38.55 bushels per acre, or 14 bushels. Farm animals show the same proportion of increase.

This was all brought about through the efforts of these experts. The information available was first put into their hands and they were sent out to disseminate it among the farmers. I am confident that if we were to adopt similar methods, we could have similar results. We have just as good land as any that is found abroad, just as good climate, and just as capable people, and yet we are away behind in our results. The State of Pennsylvania could not invest her money in a better way than by employing capable men to go out into the fields and apply the things, we Institute people have been preaching. I hope the day is not far distant when the State will take up this line of work,—whatever expense is involved will be amply repaid.

The Province of Ontario started a similar movement five years ago. They had great difficulty in getting an appropriation for it, but they finally succeeded and hired men to go into different districts and take up this work. Today they have thirty-two counties in which they have these experts located the entire year. All of the reports of their work are of most satisfactory character.

The result of twenty-five years successful operation in Belgium will surely justify a trial of the system in the United States.

The SECRETARY: Is Dr. Edwin Erle Sparks, of State College here? The light in our faces is such that we cannot see. If he is here, we shall be glad to hear from him awhile this afternoon. If he is not here we shall be glad to hear from the President of the Trustees of State College, who has been with us, and whom we are always glad to have with us. If Dr. Sparks is not here I propose that General Beaver take the floor.

Dr. Sparks was not in the room, so General Beaver, in response to the call of the Secretary, spoke as follows:



ADDRESS OF GENERAL BEAVER

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Mr. Chairman: I have been very much interested in this little story of Belgium. The people of Belgium don't compare with the people of Pennsylvania as far as I know. They have not been educated as we have been educated. They cannot assimilate ideas as we can, and they cannot carry them into effect as we can. I know that we have better educated men than they have—even with their agricultural doctors, although they may be equal to the demands made upon them there.

Now, Mr. Hamilton spoke of Mr. Hutchison's paper. The statistics in it were furnished by a railroad agent. What have the railroads got to do with it? Why, everything! If they don't stimulate agriculture in every way they can, they won't have anything to keep up their railroads. James J. Hill understands that. He is scattering prize bulls along his road in order to raise the standard of the livestock, and he induces them to be sent each spring to Chicago to compete with other prize cattle. This is not only a stimulation to his community, but it is a stimulation, also, to his railroad which brings him in his income. Now we have been thinking that the Pennsylvania and Reading systems were doing a very generous thing when they offered to send agricultural trains into Pennsylvania. Why, it is the most selfish thing they can do, and yet it is the only thing they can do, short of a system such as Prof. Hamilton has told us about in Belgium and Ontario. We may not reach this in five, ten, or even in twenty-five years, but it will come, if not through the direct agency of the authorities of Pennsylvania, it will come through the United States. Why, there are now five bills pending before the United States Congress, one to have agricultural instruction—that is, instruction in agriculture in sufficient amounts in each state so that whatever subject the people may be specially interested in, they may get information about.

Now, I was much interested in Prof. Stewart's demonstration this morning. That was a good thing to listen to; but how many of us who have heard it will take it home with us? Now if Prof. Stewart was to go to Adams county and go to a half a dozen of the farmers there and show them by ocular demonstration what can be done, these methods would be carried out all up and down the County of Adams, which has become one of our great apple-producing regions. I asked, on one occasion our friend from Berks county, what the best apple was for all purposes; and he said "Stayman Winesap," and I have had that on my brain ever since, and several weeks ago I asked Mr. Tyson to send me a box. In a few days I got a box by express and there is no reason why Pennsylvania could not produce the Winesap, as one of the leading varieties.

My old Secretary got me to go out to the Carnegie Library last year to talk to some of the boys. A friend of his who had charge of a lot of boys in Pittsburg thought the boys might be interested



in a man who had only one leg and uses crutches. Now, I never have any hesitancy to exhibit myself to boys at any time, so, of course I went. On the way he ran into a fruit shop, and knowing my fondness for apples, came out with a Winesap for me. I asked him what he paid for it; he hesitated a little, and I said "You need not be ashamed of it, Pearson; you know I value it as much if it cost two cents as if it cost twenty-five cents." He said as a matter of fact, he had paid ten cents for it. I went one year into the store of Henry Hallowell & Sons, on Broad St., below Chestnut, Philadelphia, and looking around I said, "You don't mean to tell me you erected this building?" He said, "Yes, they had just handed it over to the Real Estate Trust Co., and had it conform with theirs, so that it would rent more readily." I said, "I guess we will have to pay for it." He said, "You have paid for it." I wanted a Bellflower apple, he brought me one nicely wrapped up in a piece of tissue paper. I said, "But that is not a Bellflower." He said, "Oh, yes, it is a Western apple." I said "That accounts for it; they couldn't come up to the Pennsylvania fruit." You can't have a Bellflower without the fragrance and the taste. I wouldn't give a bushel of them for one Bellflower that comes from Centre county, Pennsylvania. And I paid five cents apiece, or sixty cents a dozen for them! Why? Because they pay attention to the picking and the packing, and consult the tastes as well as the taste of the consumer. Now, I was glad to get that box from the Tyson's the other day. Every apple was nicely wrapped up in tissue paper. They, too, are studying the tastes as well as the taste of their consumer, and there is no reason why their method should not be more generally adopted by Pennsylvania growers.

Well, now, I got off my story a little on the apple question. About these bills that are pending in Congress, I know of two or three. I heard of a couple more last night. One of them was introduced by the Senator from Georgia, who was President Cleveland's Secretary of the Interior, Hoke Smith, who has since then been Governor of Georgia. He is very much interested in agriculture. In fact, the Southern people are taking much interest in improving their agriculture, through the Department of Agriculture, of which our friend, Prof. Hamilton is an honored member—under Prof. Hays, he told me last night they have just as much pride in their agriculture in the South as we do here. Before the war, corn and cotton were kings, but now they are turning to the raising of crops such as we raise; by which I judge they are raising their corn to feed their stock and have taken to raising "hog and hominy" as well as corn and cotton.

Hoke Smith has introduced a bill, authorizing appropriation to land-grant colleges, and then giving certain amount additional in proportion to the amount appropriated by each State Legislature. For instance, it would give Pennsylvania sixty thousand dollars based upon so many millions to be divided among these states according to the amounts appropriated by their Legislatures; say the equality of Pennsylvania would be fifty thousand dollars; we would get that according to our population, providing the State Legislature would appropriate a like sum. Now, you see what this

amount would mean in carrying on the agriculture in a practical way in the different counties. If you could take Stewart into the ordinary farmer's dining-room and sit around the table with half a dozen men with note-book and pencil, and have him go over his story so that they could take it down, and it would make a difference in five years such as he showed this morning, and you could sell the apples for two dollars and fifty cents a bushel, like I paid for my box from the Tyson's the other day, you see what that would mean. Why, we have not started in our apple production in Pennsylvania, although some of them think they are getting along in certain locations.

My friend Hiester, who has gone to his Heavenly home the other day, was an enthusiast along this line. When he told me ten years ago what the possibilities of apple production were in Pennsylvania, I laughed at him. In order to get even with me, he sent me from the next meeting of the Horticultural Association, a box of Baldwin and Grimes' Golden, originated in the orchards he produced. They laughed at me for three months. I recognized the quality; there is no question about that, and there is no question about the amount, if we simply get our heads together and go to work. We used to think that Western New York was the place to raise apples; well, it is not better than Pennsylvania. Our Soil Survey shows it. Some locations are better than others. The Soil Survey people put an auger down into the ground and pull it up and tell you that that is the place to plant a Baldwin.

Now, why, I don't know, but I suppose some elements in the soil. Iron will produce color, and that is the reason the fruit is lighter in color in some localities than in others. In Centre county we are underlaid with Hematite ore, and I suppose enough of it will get into the fruit to produce color. The fruit needs the minerals as well as God's rain and sunshine. You take an apple and see what is enveloped in it, in the way of high art—in the way of beauty of color, of taste, and fragrance all combined, and then compare it with the fact that one man will devote his entire lifetime to the development of a single point in agriculture, and then think he is doing a great thing, such as Dr. Armsby is doing at State College in which he puts a steer into the Respirator Carometer and measures the breath which the steer gives up every time it breathes, and knows just how much of it is waste, and how much of the feed which is given the steer is waste, and thinks he is doing a big thing; you take this, and then you can imagine what it is to take agriculture as a whole and try to undertake to carry it out. Why, gentlemen it is the biggest thing in this world, and God made it so, because we are all dependent upon it; and if we were just able to carry out the provisions of the Hoke Smith bill—I don't know just the details, but I do know the scope of it—we could revolutionize agriculture in Pennsylvania, as they will in Georgia.

We are talking about Missions, nowadays. I have been insisting for years that the mission of America to China is agriculture. We could revolutionize it; they would be more ready to accept Christianity and we could also learn something from them. Their agriculture is altogether intensive; they have no extensive agriculture such as we have, and while we show them something of our extensive

methods, we could learn something of the intensive from them. Why think of what we might accomplish, if we were to establish an agricultural mission, as they are now trying to do from State College, by means of a young fellow who went over there to become a Professor in a Christian College, and they have him teaching agriculture and horticulture and landscape gardening, and about everything else they can get him to do, and he came home again and said: "If you will stand by me, we will start a little college settlement over there in agriculture to produce plants that you can use here, and we have plants here that can be introduced into China, so that we can be mutually helpful;" and they are going to try it. Why, there is just one of the things the Master did when he was in this world—he fed the men who were hungry, and then he preached to them, and I don't believe America could influence China more quickly and effectively than by showing them just how we do things in this country. If we could teach them to farm as we farm here in Pennsylvania, to cultivate as we cultivate here, I have no doubt we would never again hear the cry from more than three million dollars—yes, twice that, to save the lives of three million men who are starving because there is not enough for them to eat. And that is simply because they know nothing of farming. Instead of cultivating the river banks, which wash away, we would teach them to cultivate and develop the interior.

Any man who knows what he is doing and who farms intelligently, must use his brains as well as his muscles; brain and brawn are both required to produce results in agriculture. No man who undervalues what he is doing is fit, in my judgment, for his business, for it is the biggest on earth; and it takes brain as well as brawn to develop it in its fullest, and the man who undervalues it, undervalues himself as well as his business, and he also undervalues the sunshine and the rain of our common Father, which sink into the earth and cause it to produce for us the elements of life. We cannot overvalue it; let us value in its true place, what agriculture in Pennsylvania is, and may become to the generations that follow us, if we value it as we should and reach the largest results in our work.

Mr. Hutchison in the Chair.

The CHAIRMAN: I know you have been delighted with this address. We have been uplifted.

I have been thinking of our Fruit Show at Pittsburg last week. How it interested those people of Pittsburg—those city people—because it took them back to the farm! A little lady looked over the display of apples. I said to her, "Are you interested?" She said, "Yes, sir, we have a farm about twenty minutes out of the city in our auto." She could give you instructions; she had everything at her fingers' ends. She said last year they raised twenty-two hundred hogs; they have a big greenhouse and employ fourteen men, and last year they paid all expenses and showed a profit. I asked her how they did it. She said, "My father is a business man and keeps strict account of everything; you know him." It was Senator Flinn's daughter. She enthused me, I insisted upon her going up to State



College to take a short course in agriculture. She reads every bulletin and everything she can lay her hands on. Why, it is this enthusiasm that the world needs in agriculture. It is what Belgium is doing; they are raising, not two blades of grass, but three or four, where one grew before. That is what we will have to get to in Pennsylvania. I become very much enthused as I go up and down the State and see all these things. It makes me feel sorry I am growing old, just because of these wonderful things.

We hear so much of the high cost of living. The cost of living is high; but in spite of it, we could produce enough in Pennsylvania to feed our population at a reasonable cost, if all the dealers were honest. But you should have seen the short weights and measures, all from Allegheny county, that were shown there at Pittsburg last week. There was a raised basket of potatoes that the farmer sells at just measure, and it is here that the farmer and the consumer are cheated, in the difference between what leaves the farm, and what reaches the consumer from the dealer. We have a good bill on our statute books, but something must be done to get the produce in the hands of the housewife in the same proportion of weights and measures as it leaves the farmer.

Mr. Kahler has appointed the following committee on Mr. J. Aldus Herr's resolution: J. Aldus Herr, W. E. Perham, S. C. George, Dr. M. E. Conard, M. P. Shoemaker, I. A. Eschbach and Sylvester Shaffer.

Dr. Frear's report has been handed in and he has selected the best possible man to read it in the shape of a Chemist who can answer any question that you might want to ask Dr. Frear. Prof. Kellogg will now read Dr. Frear's paper.

Dr. Frear's paper was as follows:

## LOW GRADE NITROGENOUS MATERIALS IN FERTILIZERS

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By DR. WILLIAM FREAR, *Chemist*

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The average complete fertilizer sold during the spring of 1911 in Pennsylvania contained about 1.5 per cent. of nitrogen, 8.25 per cent. of phosphoric acid, and 5.0 per cent. of potash, but the relative cost to the purchaser of these materials, exclusive of mixing, bagging and freight, was 36; 30; 25; that is, the nitrogen, by far the least abundant constituent, was not only relatively, but absolutely the most costly.

The use of commercial fertilizers is steadily increasing and the demand for fertilizer raw materials is growing at a similar rate, notwithstanding the larger measure in which legumes are used in our rotations and the better conservation of domestic manures, the



demand for organic nitrogenous raw materials for fertilizers is growing far more rapidly than the supply of first class materials, such as bone, tankage and dried blood. The cost of nitrogen from these sources is rising far more rapidly, as a consequence, than that of rock phosphoric acid and potash.

The fact that nitrate and ammonia nitrogen now cost less than organic nitrogen from prime materials, might suggest that fertilizer makers would turn to nitrate of soda or sulphate of ammonia more largely than in the past. Fertilizer analyses do not show any marked tendency, however, toward such change. Manufacturers explain that fertilizers whose nitrogen is exclusively supplied by nitrate of soda or by sulphate of ammonia do not hold condition well, and consequently are unsatisfactory to the buyer because he cannot conveniently drill them; and that moreover, fertilizers that become available gradually through the season are better for most crops than are such fertilizers as hold all their nitrogen in immediately available form. There is a third reason he doesn't say much about, namely, that he has found a way to use cheap organic materials to supply the nitrogen and that, at least in many cases, he is supplying an important portion of the 1.5 per cent. we find present, by the use of hair, wool waste, leather, garbage, tankage and peat.

Decades ago, these cheap and abundant nitrogenous materials were tried and found wanting. While horn meal gave considerable crop return, woolen rags some, and hair, leather, and peat a little, these low grade materials, despite the large proportions of nitrogen some of them contained, were found to have only very low fertilizer value; consequently their use as fertilizer ingredients was condemned.

In recent years, this condemnation has gone to the length of requiring their use, when it occurs, to be declared. In the new fertilizer Act of 1909 for Pennsylvania, this requirement is made specific for pulverized leather, hair, ground hoof, horn, or wool waste, raw, steamed, roasted, or in any form.

Since the passage of this Act, no instance of such declaration has in any case come to my attention. Furthermore, a careful microscopic examination of thousands of samples has failed to show their presence. Yet these low grade materials continue to go by the train-load to the fertilizer factories and doubtless do not stay there, but come out in some condition in the fertilizer output.

These facts are admitted in a general way by fertilizer manufacturers. They explain that these raw materials, with the possible exception of peat, are, while employed in the make-up of the fertilizer, not introduced as leather, hair, etc., but are, in the course of manufacture, changed into other substances whose nitrogen is available; that by such use the general cost of fertilizer nitrogen is held down far below the point to which it would rise if the manufacturer were limited to high-grade sources of supply; and that the buyer is not injured because he really gets, as the result of the process employed, a highly available fertilizer.

I have yet to be convinced that the buyer is not somewhat injured because of the price he is asked to pay for this nitrogen in mixed fertilizers, even though the truth be admitted that the manufacturer has been at some expense in its treatment and has, by its general use, somewhat held down the prices of high-grade materials.

At this time, however, I desire to confine attention to the question whether the process or processes used, do really change the nature of these low-grade materials so as to increase considerably their availability.

The process is simple and consists either in dissolving the hair, leather, garbage tankage, etc., in the sulphuric acid later to be used in dissolving the phosphate rock that forms the major part of the fertilizer; or, in other factories, in putting the ground rock and leather, hair, etc., together into the mixer and then adding the acid. The product is a dark, spongy material called "base goods," because it is not sold directly as a fertilizer, but forms the base or principal part of various mixtures with high-grade nitrogenous materials, nitrate of soda, sulphate of ammonia, potash salts, usually with some ground limestone to act as a dryer or neutralizer of the excess acid, and sometimes with raw, ground peat to serve as a conditioner; that is, as an improver of the drilling quality of the mixture, whenever that seems advantageous.

To determine whether such treatment fully destroys the hair, leather, etc., upon which it acts, and whether the products are really much more available to plant, I have made a careful study of the effects of the treatment upon a large number of substances, with the aid of my assistants in the Department of Experimental Agricultural Chemistry of the Experiment Station. The full description of the experiment and of its results will appear in the forthcoming report of the Station, but I have considered the question dealt with of such present importance as to warrant my placing before you at this time the conclusions thus far reached.

The list of materials studied included sole leather scrap, soft leather from glove factories, pulverized steamed leather, cleaned cattle hair such as plasterers use, rotted hair, impure wool waste, fine horn meal, impure hoof scrap, peat meal and garbage tankage, together with a sample of "base goods" from a large fertilizer factory. It was found that the treatment with acid of the strength used in the fertilizer factory, destroyed with practical completeness, the tissues of these materials, so that they were no longer recognizable under the microscope.

The treatment increased the water-solubility of the nitrogen greatly in every case. In the original materials the percentage of the total nitrogen that could be dissolved by water ranged from none in the fresh hair and sole leather to 13-14 per cent. in the rotted hair and slightly fermented horn meal; but after treatment, the water soluble portion ranged from 40 to 78 per cent. of the total nitrogen present.

Furthermore, while of the total nitrogen present as ammonia in the original materials the quantity ranged from but 0.1 per cent. in sole leather to 6.1 per cent. in rotted hair, in the acid treated materials the proportion of ammonia nitrogen to the total nitrogen ranged from 1.7 to 14.1 per cent. The increase was, therefore, very considerable, but not sufficient to warrant the manufacturer in saying, as he often does, "The process converts the nitrogen to ammonia." For clearly, most of the nitrogen remains after the acid treatment in an organic condition.

It is well known that most organic materials used as fertilizers must, before they can be taken up by the plants, be converted into

ammonium salts and especially into nitrates, and that these changes are effected in the soil to varying degrees with different materials by the help of certain soil bacteria. It is needful to know concerning these nitrogenous products, how they respond to the attack of these bacteria.

The experiment included, therefore, a study upon this point. It was found that, in our soil, taken from the Station farm in a mildly acid condition, the nitrogen of the original soft leather, wool waste, and garbage tankage did not experience any change what ever to ammonia in the course of seven days, the duration of our test; but that of the nitrogen of the horn meal, 12.67 per cent., and that of the rotted hair, 15.29 per cent., appeared as ammonia at the end of this time, the other materials remaining intermediate between these extremes; whereas, a good sample of dried blood showed 19.44 per cent. of its nitrogen as ammonia after the test. In the acid-mixed materials, on the other hand, the proportion of ammoniacal nitrogen ranged from 19.6 per cent. in the garbage tankage to 84.95 per cent. in the hoof-scrap. In like manner, the nitrification test, continued for five weeks, showed in case of every material upon which it was tried a large increase of nitrification in case of the acid-treated as compared with the corresponding raw nitrogenous substance.

Finally, these laboratory tests were followed by a field test of the effect of the fertilizers, before and after acidulation, upon rye. These field tests were so affected by a mechanical source of error that I do not feel that dependence can be placed upon their indications with respect to the *individual* nitrogenous materials. By confining the attention simply to a comparison of the *group* of materials under test, the disturbing effect of this source of error are largely eliminated.

Stating the results so as to show the increase in yield of air-dry rye, straw and grain harvested when the grain was still in the dough stage, in pounds per acre, the comparison is as follows:

	Pounds	Increase due to nitrogen
Rock and potash fertilizer, .....	882.4	-----
Complete fertilizer with dried blood, .....	1,391.4	509.0
Original inert materials, .....	11201.5	320.1
Acid treated materials, .....	1,599.4	717.0

It is well established that the rate of bacterial change experienced by the same material in different soils, is widely variable. I think it unwarranted, therefore, to assume that results so favorable as those above stated, will occur with acid-treated leather, hair, etc.,



on all soils. It is my judgment, however,—and this is supported by the results of tests made earlier at the Massachusetts Experiment Station by Lindsey upon acid-treated leather and by Haskins upon acid-treated peat, that the fertilizer manufacturers are correct in claiming that the acid-treatment of most of these materials result in a very marked increase in the availability of their nitrogen.

The SECRETARY: There is no action necessary on this paper. The action on it was taken this morning.

The CHAIRMAN: I believe we have now come to the point on the program which calls for the election of officers.

The SECRETARY: I notice in the report of the Committee on Credentials, that Col. R. H. Thomas is in the audience and wishes to be recorded as present. I think he has received his appointment from the Governor, I move you, sir, that Mr. Thomas be received as a member of the Board.

Properly seconded and carried in the regular way.

The SECRETARY: Before we go on with the next number, I want to tell you of a little experience I had the other day. I went over to the office of the Auditor General, and met for the first time the new Deputy Auditor General, and he asked me some questions about the show in Pittsburg. Then he told me that several years ago while traveling in the West he met a gentlemen whom he did not know, but both being strangers in the locality, they became acquainted and the gentlemen showed him an apple and asked him to try it. He looked at it and said it appeared like a good apple, but the gentleman said, "I want you to try it." He did so, and said, "It's a good apple." The gentleman said, "That is what I wanted to know, because we are raising these apples out in the State of Oregon." "Well," he said, "I want to tell you that you can go out into my backyard, back in Pennsylvania to any old tree, and pick a better apple than this." "Why," said the gentleman, "are you from Pennsylvania?" "Yes, I am," he replied. "So am I," the gentleman said, "and every word you say is true, but I dare not say so because it would injure my business, I am selling the Western fruit."

Now, I was very much impressed by what Deputy Auditor General said, and if Mrs. Critchfield were not present, I would like to remind you that way back in the history of the human race, it was an apple that was the cause of a good deal of trouble.

At this point Mr. Gearhart took the Chair.

The CHAIRMAN: Next in order is the election of officers. The Governor being President by virtue of his office, we will proceed with the election of three Vice-Presidents.

A Member: I nominate Horace Seamans.

MR. JOEL A. HERR: I nominate Geo. G. Hutchison.

MR. HUTCHISON: No; don't put my name down, please. These honors must go round.



A Member: I nominate I. A. Eschbach.

MR. HUTCHISON: I nominate Mr. Schultz, and move the nominations be closed and the Secretary instructed to cast the ballot.

This motion was properly seconded and duly carried in the regular way.

The CHAIRMAN: I take it that they are to be elected as first, second and third Vice-Presidents. Will the Secretary cast the ballot?

The Secretary thereupon cast the ballot for Messrs. Seamans, Eschbach and Schultz as Vice-Presidents.

The CHAIRMAN: Next in order is the election of the Executive Committee. We are now ready to receive nominations.

Messrs Beck, Naginey, Fenstermaker, Holman, Biddle, Wm. F., Snively, Conard, Taylor and Black were nominated, whereupon it was moved and seconded that the nominations close.

This motion was carried in the regular way.

MR. JOEL A. HERR: I move that the Secretary cast the ballot.

This motion was properly seconded and duly carried in the regular way.

The Secretary then cast the ballot for the gentlemen as named: Messrs. Beck, Naginey, Fenstermaker, Holman, Biddle, Wm. F., Snively, Conard, Taylor and Black to compose the Executive Committee.

At this point Mr. Seamans took the Chair.

The CHAIRMAN: Gentlemen of the Board; I certainly appreciate your kindness in electing me to this office. I hardly know what my duties will consist of, but I will endeavor to do the best I can for the Board. I thank you.

The SECRETARY: Is Prof. Menges present?

PROF. MENGES: He is.

The SECRETARY: It is possible that he may be called away, and if there is no objection, we will listen to Prof. Menges at this time.

Prof. Menges then read his report as Entomologist of the Board, which is as follows:

## REPORT OF THE ENTOMOLOGIST

By PROF. FRANKLIN MENGES

The season of 1911 must have been in many ways favorable to the propagation of some insect life; especially has this been true of the Hessian fly (*Cecidomyia destructor*) and the common locust (*Rispa*) or leaf mining and-skeletoning beetle, scientifically known as the *Oclontata Dorsalis*.

The Hessian fly has destroyed from 10 to 50 per cent. of the wheat crop of the State and has, therefore, cost us millions of dollars. Spraying for this insect is impossible and the insect enemies, which number so far as our present knowledge goes, from 10 to 14 different species, seem to lose absolute control of this fly during some seasons, while during other seasons they keep it in subjection and little damage is done.

### DRY SEASON DESTRUCTIVE

Entomologists who have investigated the fly tell us that a dry season, especially during July and August, is very destructive of the pupa or the quiescent stage in the life history of this fly and, therefore, we would conclude that very few of the pupa of this insect would have escaped one of the longest, most extensive and destructive periods of dry weather (that of 1910) that has been experienced in the State for a long time, and yet the following season the Hessian fly was the most abundant and destructive for many years. The question naturally comes up, why is this if dry weather is such a menace to the development of this fly, and in so far as possible we shall endeavor to answer this question. In looking up the temperatures for July, August and September, 1910, we find that the weather was comparatively cool, in fact so much so that the farm crops did not suffer such extreme desiccation as they would had the temperature been higher. The same is true of the Hessian fly, for we find that the desiccating effects of the hot sun when the ground is dry have, in many instances that have been thoroughly investigated, destroyed well nigh the entire brood lying dormant in the wheat stubble and on the ground. Here we have two climatic conditions that will destroy the Hessian fly, hot and dry weather, therefore, if immediately after harvest the ground is dry, the weather hot and plowing difficult, and a wheat stubble field is known to have quite a brood of dormant Hessian fly in its stubble and on the ground it is not necessary to plow the field early to destroy the fly because heat and dry weather will do this just as well.

### BOTH SOWINGS INFESTED

But, if a drought prevails, as it did in the summer of 1910, and the weather is cool, the pupa of the Hessian fly will lie in the stubble until there is moisture sufficient for the fly to change from the dormant to the adult stage, or the full-fledged fly, which, on account

of there being a little rain in 1910 until very late in the fall, may not have taken place until, perhaps October, so that both early and late sowing were equally badly infested. Another thing. In some places where there was sufficient moisture together with the prevailing cool weather there may have been more than the supposed usual two broods of fly and the likelihood is there were more than the two broods in some places.

#### PARISAN EXPERIMENT

Dr. Paul Marchal, of the Institute Agronomique, in Paris, France, in order to determine how many broods of Hessian fly could be produced under the most favorable conditions, began a series of experiments in April, 1894. His plots of wheat were enclosed so that there would be no infestation from without. From puparia which had been collected March 12, of that same year, imagos issued April 5. These proceeded to lay eggs on the wheat growing in the plot in which they were inclosed. These eggs hatched larvae that fed on the wheat as they would in Nature's realm and changed into puparia from which flies issued May 30. These flies were put into another plot of wheat, especially prepared for them, and the third generation of flies was flying in these cases July 1. In like manner a fourth generation of adults developed from this third one, by August 5, and from these the fifth generation appeared September 4, and sixth by October 18, which deposited eggs that produced larvae which changed into the puparia and went into winter quarters.

#### WHEAT IS GOOD FOOD

These experiments were made in France where usually climatic conditions are most favorable for the development of the Hessian fly. The likelihood is that it is seldom the case that anything like such conditions prevail in any section of this country, that food for the larvae such as growing wheat, rye and barley, which seem to be the only food plants upon which the larvae feeds, are provided in nature in anything like sufficient quantity to develop such a number of broods, but in some instances similar conditions may have prevailed last season. During July, August, September, October, and even into November of 1910 this dry and cool weather prevailed.

#### BRED WITH EASE

In many places on the farm, either in the unplowed stubble field, for many farmers on account of the drought did not plow until late, or in the stubble field sown with grass there was sufficient moisture for the fly to pass with ease through all its stages of development and with few of its parasitic enemies present as was the case last year, and with sufficient volunteer wheat growing either on the unplowed stubble field or on the field sown with grass to furnish food for the larvae, ideal breeding places were provided on the farms of well nigh all wheat raising farmers, for the development of perhaps three or four broods of this pest during the past season.

### LIKE STUBBLE FIELDS

The stubble fields sown with grass is an especially favorable place for the breeding development of the Hessian fly, because if there has been a fair stand of clover and timothy it furnishes protection from the dessicating heat of the sun. If this has not been the case weeds will soon spring up to do the same thing. Volunteer wheat comes up early and late, depending on location, and grows and furnishes food for the larvae which go on their way of reproduction unmolested by inspectors or poisonous sprays.

### FREQUENT CULTIVATION

The stubble field that is to be plowed to be sown with a second crop of wheat may have similar conditions to the ones already described as pertaining to the field sown with grass, but in this case if the field is plowed early and after plowing frequently cultivated to prevent volunteer wheat from growing, no food for the larvae is provided, and consequently no adult flies can develop. This is farming to destroy the Hessian fly, whereas sowing grass with the wheat and raising weeds after harvest as is the case in the stubble field sown with grass, is farming to raise Hessian flies, because here the most favorable conditions prevail.

### WHY IS IT NOT WORSE?

With agricultural practices as we have described them, providing favorable breeding places for this pernicious insect during the whole period of time which it develops with volunteer wheat, which begins to germinate soon after harvest and only stops with the coming of winter, is it not a wonder that our wheat fields are not annually devastated by this insect? That they are not so devastated is due the parasitic enemies of this fly, which keep on its heels so closely that it is seldom abundant and destructive for more than a year at a time. Here is a field for investigation and original research as to how the farmer may co-operate with these parasitic enemies of the Hessian fly in his agricultural operations that it may never be abundant and thus save millions to the State and nation.

### ANOTHER WHEAT PEST

The wheat midge (*Diplosis Tritici*) seems to have appeared in some sections of the State. The larvae of this insect comes from an egg deposited by the adult midge in June, in the blossoms of very young kernels of the wheat head and feeds upon the kernel and dwarfs it or causes its entire abortion. Deep plowing and either packing the chaff or using it for roughage will keep down this insect.

### SPRAYING MIXTURES

In my report of 1910 I referred to the injurious effects of some insect and fungicide spray mixtures especially fungicides. It has been assumed that solid bodies can not enter the epidermis of healthy plants, and so far nothing has developed to show that they can, and with this assumption not disapproved the question naturally arises why then do arsenical sprays that have been regarded insoluble in water injure foliage. The fact that under the conditions of solubility



as tested by the chemists in which a substance is exposed to the action of the solvent, which is pure distilled water, for a comparatively short time the substance may be insoluble, but the same salt, when exposed for whole nights and days at a time to water completely saturated with the gases of the air or in natural water such as is used for preparing spray mixtures and usually containing chlorides, carbonates, sulphates, etc., of the alkali and alkali earth metals in quantities as these in natural water these arsenicals become soluble. This is especially true of the arsenate of lead as it appears in the markets. W. H. Volck, of Watsonville, Cal., \* \* has found that the foliage of fruit trees of the Pajaro Valley, which opens to the ocean and because of the atmospheric conditions on this account becomes covered early in the evening with dew which remains on the foliage all night and often far into the day, because of the fogs that prevail and continue at times for several weeks, that here the foliage of apple trees is remarkable susceptible to such an extent as to interfere with the effective control of the codling moth by these sprays. It was found that different samples of arsenate of lead, when dissolved in natural water and when applied at the same time under similar conditions of dew and fog and the same kind of foliage, did no harm, whereas in the case of other samples the effects varied from slight injury to well nigh entire defoliation. These effects indicate a radical difference in the chemical properties of these samples of lead arsenate which was found to be the case. For example it was found that lead arsenate as it comes into the markets usually contains the pyroarsenate, which is soluble in ammonia and the acid arsenate which are stable under acid conditions, but under neutral and alkaline conditions these change into the orthoarsenate the most stable compound, with the liberation of arsenic oxide or an alkaliarsenate, which are soluble in water and destroy foliage. From this it appears that when arsenate of lead, if prepared for spraying in water containing alkali salts, or when it is exposed on the surface of the leaves, the action of the neutral water of fogs and dews that the pyroarsenate and the acid arsenate change into the orthoarsenate, liberates arsenic oxide or an alkali arsenate which, because of its solubility, is taken into the leaf and the leaf tissue destroyed. Therefore, the orthoarsenate is the only compound that should be used in spray mixtures, and it has been found wherever this substance has been used in the pure state no burning of foliage has taken place. As already stated, the pyroarsenate of lead is soluble in ammonia, and also that when the arsenate is exposed to neutral water and water containing alkali salts, it changes into the orthoarsenate of lead with the liberation of arsenic oxide or an alkali arsenate. If, therefore, there is any pyroarsenate or acid arsenate of lead present in a sample of lead arsenate the only thing necessary is to take a sample of half an ounce or an ounce macerate it and mix with about a gill of water in a granite or porcelain lined vessel. Then add as much strong ammonia as water and mix again and heat slowly and mix while heating and finally bring the substance to a boil. Set aside and allow the mixture to settle and cool, and then pour the clear solution through a filter into a funnel. Boil the solution until about all the ammonia is driven off. To the solution that remains after the ammonia is driven off add acetic

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\*\*Science, June 2nd, 1911, Vol. 33, Page 866.

acid or strong clear vinegar until it is distinctly acid, then a clear strong solution of lead acetate or sugar of lead, to which a little acetic acid or vinegar has been added, if a white precipitate forms when the solutions come together or are shaken up together, then the sample of arsenate or lead contains arsenic oxide or a solution arsenic and will burn the foliage of fruit trees.

Here it seems we have at last an arsenical that can be prepared in such a way that it will not burn foliage.

The CHAIRMAN: What shall be done with this paper?

On motion, properly seconded and duly carried in the regular way, this paper was received to be filed for publication with the proceedings.

The SECRETARY: This, I believe, completes the program for the afternoon. We have still a little time before us. Has Dr. Edwin Erle Sparks, President of State College come in? I see he has. We shall be glad to have Dr. Sparks address us at this time.

#### ADDRESS OF DR. SPARKS

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I am sorry I could not spend more time with you today, but I spent most of my time in the Department of Health, trying to convince them that I knew better where a sewage disposal plant should be located than they did. I have been beaten, I may as well confess, so I will turn to a more pleasant subject.

What can we do to disseminate more information to the common people? How can we bridge over the chasm between the people and the college and the experiment station? We have tried bulletins, more recently we have tried the experimental trains; and yet we cannot reach them—more especially, we cannot reach the boys and the homes that need the information the most.

There is a bill before the Federal Congress. Mr. Hoke Smith has the bill in charge, I believe, and we have very great hopes that it will pass the House of Representatives. Mr. Smith is very desirous to know what the sentiment is, in Pennsylvania, towards this bill, and I hope before you adjourn, the State Board of Agriculture will vote to express approval of this bill which provides that a fund of \$6,000,000.00 be set aside for the purpose of spreading information on agriculture, domestic science and pursuits in rural life.

The second thought in my mind is, that I believe much of the success that has come to the College has come from the efforts of the State Board of Agriculture.

What can we do for the farm in order that we may keep our boys and girls there? How can we show that education in agriculture is just as necessary as education in reading, writing, literature and the curriculum of the public schools? The trouble is that the teachers don't know how to do this. In many states we have legislative acts requiring agriculture to be taught in the public schools, and

this means that the teacher will simply take a text-book and ask the question at the foot of the page. I think it should be labelled, "First aid to the injured," because that is what it is. The last paper shows the result of scientific study, and only scientific study can properly enable one to teach agriculture successfully. Last year I was at an Institute in a state, not Pennsylvania, where the law required that a part of the Institute time should be devoted to this work, and the County Superintendent said, thirty minutes would satisfy the law. So the instructors drew lots to see which one should give this half hour's talk. Under such conditions, how can it be expected that any interest will be aroused in agriculture?

Another bill introduced into Congress is known as the "Page Bill," and provides for a sum of money to be granted by the United States for the purpose of teaching agriculture in the Normal Schools of the United States. This may help out to some degree. We must first teach the teachers the subject, and we are trying to do this to some extent by the Summer session for the teachers at State College.

Here is where you give me the opportunity to advertise as you so kindly do. The first summer we had one hundred and forty-seven teachers in the Summer session. We have only pedagogue classes, so that any class is a teachers class. The second summer we had two hundred and nineteen, and this next year we expect to have at least three hundred. The third session begins about the 19th of June and continues during the four weeks of July. Most of the teachers take the course in agriculture. They pay \$3.50 a week for board, and if the price of butter does not go any higher, we still hope to be able to give them butter and not oleomargarine, even at that price. Then they pay \$1.50 for room rent, and \$5.00 for instruction during the six weeks session. This last five dollars is simply a nominal charge to arouse their interest, because we do not believe it pays to give something for nothing. The teachers last year spent an average of \$41.00 aside from carfare. We think this is about as cheap as we can afford to make it. I ask your help in spreading these things, so that the teachers may learn of them and come to spend the last two weeks of June and the four weeks of July at the College and still have the entire month of August left for recreation.

The next item is that the new school code, as passed by the last Legislature, gives us four new assistants, to Dr. Schaeffer. One of these assistants is an expert in agriculture, and his subject is to study how to introduce agriculture in the public schools. Much will depend on this man, and much will depend on the help you give him. We have found the man; first he has been a country teacher, and later became a principal of a high school, at a salary of eighteen hundred dollars, and then entered college as a man of mature years. Now I trust you will all give Mr. Dennis, (this is his name) all the help you can, so as to make him as useful as possible in studying and establishing agriculture throughout the country. I commend Mr. Dennis most heartily to your consideration.

I will not take your time in speaking of my favorite topic—educating the country boy to take an interest in the farm, instead of leading him towards the city, as the present curriculum does. Once



he is convinced that it requires some brains to be a farmer as well as a three dollar a week clerk in a store, he will want to stay on the farm.

I congratulate the State and the Board, the Secretary, and Mr. Martin, and the host of Institute workers throughout the country, on the strides agriculture is making.

This Page bill also carries a provision that calls for an appropriation of money according to the rural population in proportion to the rural population of the United States.

The CHAIRMAN: This completes the program for this afternoon. This evening we will meet at half past seven. I hope you will all be present.

The SECRETARY: I am requested to announce that the Executive Committee will meet tomorrow morning at nine o'clock in the Department of Agriculture, in the Secretary's room.

We will now stand adjourned until 7.30.

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Harrisburg, Pa. Wednesday, January 24, 1912, 7.30 P. M.

Mr. Seamans in the Chair.

The CHAIRMAN: The meeting will please come to order.

MR. HUTCHISON: Mr. Chairman, I have here a resolution to offer in reference to the Hoke Smith Bill, if it is in order.

The CHAIRMAN: The gentleman will proceed.

Mr. Hutchison thereupon offered the following resolution:

*"Resolved, That we heartily endorse Senate Bill No. 4563, supplemental to the acts for Federal support of State Agricultural Colleges and Experimental Stations, providing for National appropriations for giving instructions and demonstrations in agriculture and in home economics, applicable to rural life to persons not connected with said colleges, but residents of the State. We believe that such legislation will vastly improve the condition of the rural communities by disseminating practical information, and we call upon Congress to enact the same into law."*

I move the adoption of this resolution.

This motion was properly seconded and duly carried in the regular way.

The CHAIRMAN: Anything further before we take up the program? If not, we will proceed with the first number on the program, "Fertilizers," by J. H. Schultz, Chairman.

Mr. Schultz's paper was as follows:



## REPORT OF COMMITTEE ON COMMERCIAL FERTILIZERS

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 By J. H. SCHULTZ, *Chairman*


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The writer of this report has been a farmer for thirty years, but at present he is engaged in the manufacture of Commercial Fertilizers; consequently this report is written from the standpoint of the farmer, as well as the manufacturer.

The last ten years have brought about great changes in the fertilizer business. In the past when the farmer wanted to buy fertilizers, he asked the dealer for a \$15.00 or a \$20.00 fertilizer, and if the dealer had a brand that would sell for that price, the farmer would buy it without considering the analysis or the manufacturer that made the goods, and, if the analysis entered into the deal at all, it was only in a casual way, because in the majority of cases the farmer did not know what analysis a fertilizer ought to have in order to be of the greatest value to him. But with the aid of the State Board of Agriculture, our Agricultural College, Experiment Stations and Farmers' Institutes, the farmer of today is better informed. As a result of this education, the consumption of the better grades of fertilizers is increasing much faster than the lower grades, because the farmer has learned that he buys a unit of plant food in a high grade fertilizer for less money than the same amount of plant food can be bought at in a low grade fertilizer. When the farmer is in the market to buy fertilizer he wants plant food and if he buys a low grade goods he must very often buy two tons of fertilizer in order to get the same amount of plant food as contained in one ton of high grade goods. It costs the manufacturer as much to mix, bag and sell a ton of low grade goods as it does for a ton of high grade goods; consequently the farmer is compelled to pay the cost of mixing, bagging, selling and the freight on an extra ton, where if he was properly educated he could buy the same amount of plant food in one ton and thereby save the labor of handling the extra ton. The use of high grade fertilizer would eliminate the question of a filler which is a source of great worryment to many farmers. The fact is that the manufacturer has never made a cent of profit on the filler which is used in low grade goods and I am sure that the farmer is not benefited. When the writer is in the market for fertilizer for his own farm, he wants nothing but the highest grade of fertilizer he can get, because in that grade of goods he is sure that the manufacturer is not obliged to use a filler of any kind.

A very important point that I want to take up in this report, and that is the source from which the manufacturer derives the different elements of plant food contained in the fertilizer he manufactures; and this is a point on which the farmer has not got the proper protection. This has reference more particularly to ammonia, as a unit of ammonia in leather scrap or hair refuse can be bought for \$1.00, while a unit of ammonia from animal tankage, blood or bone costs the manufacturer \$3.00 or more on the present market, and

when the State makes an analysis of the two different ammoniates it gives one as great a commercial value as the other in spite of the fact that one costs \$1.00 and the other \$3.00 per unit.

Some of our chemists tell us in the most positive terms that they can tell the source of ammonia; whether derived from leather scrap, hair refuse or from animal tankage, blood and bone. We have on our statutes a law which compells the manufacturer to print it on the fertilizer bags if he uses leather scrap or hair. We do not know of any manufacturers who are printing their bags in this way, but we *do* know that thousands of tons of leather scrap and hair refuse are used in the manufacture of fertilizers and sold to the farmers of Pennsylvania. If the chemist cannot tell where the ammonia is derived from, then it is very important for the farmer's protection that the State appoint inspectors to visit the different fertilizer plants to see what materials are used and thereby restrict the use of inferior or worthless materials.

If this method is not pursued, it will continue to work a hardship on the manufacturer who is making an honest fertilizer; because he must meet the competition of low grade materials. If the farmer was more observing to note the results obtained from the use of the different makes of fertilizers on his crops, this matter would not be so serious, as he would find that a fertilizer manufactured from animal tankage, blood and bone would give far better results than a fertilizer manufactured from inferior materials, such as leather scrap, hair refuse, etc., and he would be guided more by results in the field than by the commercial value. The writer wants it thoroughly understood that this does not reflect upon our Department of Agriculture in any way as he feels that under the present statutes the Department is doing everything in its power to protect the farmer from being imposed upon; but it is unfair that the chemist has no sure method of telling from what source the nitrogen is derived and the only methods that the writer can suggest to overcome this evil is the appointing of inspectors to visit the different fertilizer manufacturers doing business in the State of Pennsylvania.

The last few years has proven to be years of great progress in the fertilizer business, both from an inventive as well as from a manufacturers' standpoint. With the improved machinery, fertilizers can be manufactured and handled at less expense than it ever could before. The scientific man has found a way whereby he can extract the nitrogen from the air and put it in a commercial form, to be used in commercial fertilizer, and by this method he has procured a supply that is unlimited. The ammonia that is sold in this form is known as Calcium Cyanamid. A very complete article on this subject can be seen in the American Fertilizer of September 23, 1911.

Quite recently a process has been patented whereby the phosphoric acid in phosphate rock can be made available without the use of sulphuric acid, and by this method the injurious effect of sulphuric acid to the soil will be eliminated. The process consists of first grinding the phosphate rock into floats and then mix with the floats about 15 per cent. of niter cake and roast this mixture in a rotary kiln, heating the floats to a temperature of 2,700 degrees Fahrenheit.

By this process a unit of phosphoric acid can be made available at less expense than it can be done by the use of sulphuric acid, and yet it is preferable to the old method on account of the injurious effect sulphuric acid has on the soil. By this method it is possible to make a phosphate that contains 30 or 32 per cent. of available phosphoric acid and this can be done with phosphate rock containing 72 per cent. of bone phosphate of lime. The writer has given considerable of his time and means to the development of this process, and the parties interested expect to, in the near future, to put it on the market in a commercial way.

The SECRETARY: Now, while this question is fresh in my mind. I would like to ask whether anybody noticed what Dr. Frear said about the ability to distinguish the elements that went into the ammonia? I think I understood that after they had been treated with the acids it would be impossible to tell the source from which they came. Am I correct?

A Member: That is correct.

MR. JOEL A. HERR: He said you could not discover it with the microscope.

The SECRETARY: That brings me to the question of how would an agent of the Department, even if he gets into the warehouse, discover the waste from which it is made?

MR. SCHULTZ: I think the question is important enough for the Department to appoint an agent and give him authority to go and look.

The SECRETARY: How about the wool waste and hair?

MR. SCHULTZ: Wool waste cannot be used with the acid; the tannic acid will dissolve it; but the agent will find it as well as I do.

The SECRETARY: But, you know, "Birds of a feather will flock together." When a manufacturer comes into the office of a plant, courtesy will demand that he be shown around.

MR. SCHULTZ: If he is a competitor it would not; but he is far enough away not to be a competitor.

The SECRETARY: You will excuse my persistence in the matter, but this is the first knowledge I have of this and there is no one who is more interested in getting good fertilizer to the farmer than I am. I use a good deal of it on my own land, and I will say right here that I am willing to do everything in my power; but if I should employ such an agent would it not be very hard on the manufacturers of Pennsylvania? We get a very large proportion of our fertilizer from New York, Ohio, Maryland and Virginia and we would have no authority to go into these states. We could only confine our inspection to the State of Pennsylvania.

MR. SCHULTZ: It is a matter important enough to be taken up at Washington. I am a manufacturer, but my heart is with the farmer, and I am sorry for him, for he must work too hard to pay for something that is worth nothing to him.



The SECRETARY: The Inter-State Commerce Act would regulate the shipping from one state to another, but this State cannot act unless there is a law also on their statute books.

MR. SCHULTZ: The man in the other states might allow you to inspect his factory; or if not, you could prohibit his shipping into the State.

The SECRETARY: Well, now, I would like to have your opinion as a manufacturer, as to the possibility of our getting access to a warehouse where these goods are likely to be stored. I am not trying to dodge responsibilities one bit. I am only trying to get at it. Don't misunderstand me when I bring up what appears to be objections.

MR. SCHULTZ: I understand your position in the matter, but there is no question in my mind but that it should be done.

The SECRETARY: This would also include you.

MR. SCHULTZ: We have an offer open for every Subordinate Grange in the State of Pennsylvania to send a representative to inspect our works at any time. A man who wants to be honest must be ready for inspection at any time.

MR. JOEL A. HERR: I spoke to Dr. Frear, at State College, on this question, and he said it would not be possible to detect it under the microscope. And, here is another point: Our law now does prohibit it. The source must be mentioned on the sacks. But it is not done; now, you take a man and prosecute him; how can you find out where he gets his materials from, unless you are there while he manufactures? The microscope does not show it; the test is to use it.

The SECRETARY: If we have authority to go through the warehouse and find these things stored there, we would still have to prove that they are used in the manufacture.

MR. SCHULTZ: If you could protect the manufacturers of Pennsylvania, the other fellow could not come in; he could not find a market.

The CHAIRMAN: If there is nothing further, this paper will be filed and printed with the proceedings, and we will pass on to the next subject, which is the Report of the Committee on Wool and Textile Fibers, by Mr. A. L. McKibben, Chairman. Is Mr. McKibben present?

The SECRETARY: Mr. McKibben has not answered roll-call and I have not seen him. That item will have to be passed, Mr. Chairman, with the understanding that if his report appears, it is to be printed with the proceedings.

Mr. McKibben's report was sent in later and is as follows:



## REPORT OF THE COMMITTEE ON WOOL AND TEXTILE FIBERS

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By A. L. McKIBBEN, *Chairman*

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In the year ending 1910 there were 57,216,000 sheep in the United States, having a total farm valuation of \$233,664,000 or a valuation of \$4.08 per head. The increase in total numbers during the last decade was 36.6 per cent.; in total farm valuation 90.4 per cent. and in valuation per head 35.9 per cent. Increase in numbers and increase in relative value per head being practically the same. The total number of sheep in the world in 1910 was 605,050,853, the United States ranking fourth, with Australia, Argentina and the Russian Empire leading in the order named.

Totally, the world's production of wool in 1910 was 2,985,000,000 pounds, representing an output of 4.9 pounds per head. While ranking fourth in number of sheep, the United States ranks third in production of wool. In 1910 the total production of wool in the United States was 328,000,000 pounds; in Australia, 718,000,000 pounds; in Argentina, 414,000,000 pounds and in the Russian Empire, 238,800,000 pounds. The fact that 3 pounds of wool represent the production per head in the Russian Empire and 5.7 in the United States explains our higher ranking. (Pounds of Wool per head is considering hereby the total number of sheep and not by the number at shearing age).

Imports of sheep in 1910 were 126,152 head, valuation being \$5.52 per head. Decrease of 218 per cent. in imports, and an increase of 54 per cent. in valuation was shown during the last decade. The exports of sheep from the United States totaled 44,517, and the price per head was \$4.69. During the past ten years exports decreased 182 per cent. and valuation decreased 24 per cent.

Year ending June 30, 1910, the total imports of wool into the United States were 263,938,232 pounds, having a total valuation of \$51,220,844. Of all the imports, including animals and animal by-products, excepting silk, wool is the highest in value. The United Kingdom leads in importation of wool into the United States with 91,000,000 pounds; Chinese Empire ranking second and Argentina third. Mainly first and third class wool is imported. (First-class, clothing; second-class, combing; third-class, carpet or blanket).

The total production of wool in this country is 281,400,000 pounds exclusive of 40,000,000 pounds pulled wool. Every state in the Union produces wool. Pennsylvania ranks thirteenth with a production of 6,300,000 pounds. In 1910, this State had 1,030,000 sheep of shearing age, 6 pounds of wool being the average weight of fleece. The shrinkage of wool was 48 per cent., while that of the United States was 60 per cent. Pennsylvania ranks thirteenth in production, eleventh in numbers, twenty-first in shrinkage and twenty-fourth in

total weight of fleece. Wyoming ranks first with 36,000,000, and Montana second with 33,600,000 pounds. Of the states east of the Mississippi, Pennsylvania ranks third as a sheep state, led by Ohio and Michigan.

SHEEP AND WOOL PRODUCTION IN PENNSYLVANIA, 1840-1910.

Year	No. of sheep at shearing age	Wool production	Wool per head
		lb.	lb.
1840, -----	1,767,620	3,048,504	1.75
1850, -----	1,822,357	4,481,570	2.43
1860, -----	1,631,540	4,752,522	2.91
1870, -----	1,794,391	6,501,722	3.65
1880, -----	1,776,598	8,470,273	4.77
1890, -----	945,002	4,800,610	5.03
1900, -----	776,077	4,666,062	6.00
1910, -----	1,030,000	6,300,000	6.09

Wool production has been associated with Pennsylvania from its very existence. In 1683, a letter by Wm. Penn states that wool production was one of the agricultural features in which the Quakers were interested. Its production gradually increased as an industry until 1840, when the number of sheep in the State reached a climax, at which point the number of sheep raised remained practically constant for more than forty years. However, improvement was going on, the production of wool increased. During this period and previous, the production of wool within the State was not constant. The fine-wool sheep gradually went westward from eastern counties around Philadelphia to Washington, Greene, Fayette, Mercer, Erie, etc., in the western part of the State. In 1880, the counties of Washington, Greene and Fayette were recognized as the breeding center of fine wool breeds of sheep in the United States.

Due to the cheaper production of wool in the West, we find that the production had decreased 2,091,449 pounds in 1890, and by 134,548 pounds more in 1900. In 1910 we have an increase over 1900, showing that the West must now compete with the East in cheapness of production of wool and mutton.

The average price of wool on the Philadelphia market in 1910 was 32c per pound. According to the recent investigation by the Tariff Commission, the duty on wool will be lowered. Expert investigators have concluded that the raising of sheep for wool alone will not be profitable with the lowering of the tariff. Therefore, the demand for wool will have to be satisfied as it has to some extent in the past, by the raising of sheep for wool and mutton. Smooth-bodied, mutton-typed, fine-wooled sheep and such medium woolled breeds as are efficient in both wool and mutton will be raised.

Pennsylvania has considerable land lying idle which could profitably produce wool and mutton. The limestone sections of this State are especially adapted for fine-wooled sheep. It is quite generally conceded that such soil will give whiteness, pliability and silkiness to wool, also affording the best pastures and abundance of winter feed.

Sheep are cheap feeders, and breeding stock can be maintained on cheap roughage rations supplemented with concentrates during pregnancy and suckling periods. Much feeds will be utilized by sheep which otherwise goes to waste. J. E. Wing says, that out the 600 known varieties of farm weeds, 576 will be eaten by sheep. This fact shows their usefulness as weed destroyers on the farm. Breeding animals of fine wool type over-pay their coat of maintenance by the wool production. Most medium and long-wooled breeds will pay from  $\frac{2}{3}$  to  $\frac{3}{4}$  their cost of maintenance by their wool production. Sheep can give, especially on rough land, more profitable returns than any other class of livestock. The fertility of the soil is greatly enhanced by sheep. The fertility value of sheep manure is above that of horses and cattle.

The dog nuisance and parasites keep farmers generally from going into the sheep business. The dog nuisance is exaggerated, but is a factor to be considered. Laws should be passed and enforced to limit the number of stray dogs. Care and management of his flock can keep the farmer out of danger of loss from parasites.

Silk is another animal fiber, 70 per cent. of which is produced in Asia. The production of silk is less than the demand, artificial silk being manufactured as a substitute. In 1910, \$67,129,603 was the value of silk imported into the United States. Imports of silk were \$15,891,759 in advance of the value of imported wool.

Cotton is the leading vegetable fiber produced in America. The cotton crop of the United States for the past year broke all previous records with a production of more than 14,000,000 bales. In 1910, 11,941,563 bales were raised, in which year the United States produced 66 per cent. of the world's crop of cotton.

The acreage of flax seed was greater in 1900 than 1910 by 794,483 acres. Production, however, was less by 354,591 pounds. In 1910 the acreage was 2,916,000 and the production 19,624,901 pounds. Importations increased by 47 per cent. during the last 10 years. Its production is mainly confined to the Central and Western states.

Government experimental results show that hemp is a most valuable fiber for the manufacture of high quality paper. As wool is not cheap enough and as the scarcity and the increasing value of wood pulp continues, the value of hemp in the production of paper may soon be realized. The production of hemp in the United States in 1911 is estimated as being 12,000,000 pounds.

Of all fibers, wool is the important one from an agricultural standing in Pennsylvania. With its suitability to wool and mutton production, this State should continue its increased production.

The CHAIRMAN: We will proceed with the next number, the Report of the Committee on Livestock, by Mr. A. P. Young, Chairman.

Mr. Young made the following report:



## REPORT OF COMMITTEE ON LIVESTOCK

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 By A. P. YOUNG, *Chairman*


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One of our leading experiment station directors is reported as saying recently: "It is the livestock of the English farms to which they owe the wonderful maintenance of their fertility." Scarcely any farmer be he grain, hay, dairy, or truck farmer has manure enough for the needs of his crops because his way of doing it does not provide for the support of a large number of growing horses, cattle, sheep or hogs to the acres he covers. So far, too little attention has been given to this matter in this country; too many of our farmers raise crops to sell as grain and hay instead of working them up into more concentrated forms and saving the resultant fertility to make the farm more productive. Every farm should have a large stock of young animals coming on and a corresponding number finishing off. In support of these he should devote the land contiguous to the barn to leguminous soiling crops and to crops for filling the silos of which he should have at least two, a small one to bridge over summer droughts and a larger one for use during the main feeding season, depending upon these and upon soiling more and upon pasturage less to maintain and finish off his animals.

Ensilage and leguminous crops, including alfalfa, will enable the farmer to feed profitably a large number of animals. When the farm of one hundred acres is able to feed thirty to fifty cows, a goodly number of young stock, besides the number of horses necessary, together with colts and hogs, either of these may be a leader, each farmer choosing the animal he fancies and his particular farm is best adapted to handle, supplementing the feeds produced with others from the market to make each animal do its best, and saving the resultant fertility to apply to the crops. That kind of farm management will soon make the farm a noted one in the community. The environment and the temperament of the farmer should both be taken into account in determining the kind of animals to receive most attention. The man who has particular liking for horses may, if his farm is adapted to their handling profitably, engage in the production of marketable horses. Horse flesh sells for more than beef, pork or lamb, indeed it will average about as high in the rough as dressed turkey and when facilities are right for handling does not cost more pound for pound than either of the first named meats. There is a wide range for choice, the draft horse, trotting horse, mule and all that lies between. The man wishing to go into horse production should be sure that he can get on good terms with his animals. They should always be pleased to see him approach. If this be so they will soon learn to have confidence in him and willingly do whatever may be required of them and their value be enhanced accordingly. Pennsylvania should raise more of the horses she needs, the conditions are all right in many section of the State to make the business profitable.



The process of subduing a new acre to supplement a worn one culminated a generation or two ago, the result of that way of doing brought into cultivation many acres that should have remained in forest. In the hilly portions of our State are to be found much land that can never be made highly fertile, the soil being light, if filled with humus it becomes lighter still and the dashing rains carry it away. Such land may be handled better by keeping it most of the time in grass either as mowing or pasture land thus enabling the keeping of more animals and making the acres more advantageously situated, more productive. We have spoken of the horse first because of the nobility of his nature and the commanding position he occupies in the economy of our farm operations.

When we come to consider the matter from a dollar-and-cents point of view the Bovine race takes first place in both number and value. Wherever it is possible to cultivate the soil, and indeed in places where cultivation is well nigh impossible, the cow and her progeny may be made to assist man in his battle for comfortable subsistence. As healthful and acceptable food producers there are no rivals. They can rough it on the mountain side or luxuriate in the valley, adapting themselves to the surroundings and to the fare provided by the locality. If milk is wanted, the developed cow is able to produce it in profusion. With equal facility some of the family with man's manipulation are made to turn out butter fat profusely. This with the solids accompanying it makes cheese possible; milk, cream, butter, cheese, veal, beef and all related mixtures and possibilities. What a bill of fare; and all from one source. The possibilities of the ox as a laboring beast is of no inconsiderable importance in some sections, this, too, is worthy of credit to this class of farm animals.

In the economy of animal food production, swine comes next to cattle, the facility with which they increase and the short time required to come to maturity makes its comparatively easy to stock up with them and get ready for an anticipated market. Some mathematical expert has figured out that a sow having a litter of six at a time in ten generations will produce 6,500,000. Nearly every farmer and many householders who are not farmers keep two or more pigs to utilize the waste of the table, the trimmings of the vegetables, all of which are turned to good account by the pig which in turn makes no inconsiderable addition to the family larder. Ham, bacon and lard, the various smoked products, to say nothing of sausage, scrapple, sparerib and other dainties prepared at butchering-time are handy to have in reach at any season of the year.

The most profitable hog is the one that will most quickly turn raw material into more valuable pork. Living and growing on suitable pasture, utilizing otherwise waste products, and requiring no great amount of extra food to round him out at the close of his career, the hog is an economical proposition to every householder who is situated so as to care for him properly. In that section of our country spoken of as the corn belt, the possibilities of the hog are immense, and even in Pennsylvania very good returns may be secured by good management even if so large herds are not kept. As in other branches of the livestock industry, the sire is important, he may not be literally, "half the herd" but in most cases much of the profit depends upon him.

In hog raising a good start is important. A stunted pig is often a losing proposition and this condition is easily brought about by improper feeding of the mother in the early days of the youngsters' lives. Little feed and that of a somewhat bulky and easily digested kind should be the rule for the first few days. After the litter is a week old if all has gone well the embargo on feed may be raised and good feed and plenty of it supplied, soon as the little fellows manifest a desire to eat a side table, accessible to them, supplied with such as they like will push them along up towards 300 pounds at eight or nine months old. Grass, clover, rape, peas are good for growing hogs; so are potatoes, apples and roots generally, remembering that potatoes and roots should be cooked.

Although the dog nuisance has nearly wiped out the sheep industry in some sections of the State, a report on livestock will not be complete without reference, at least to it. We have in Pennsylvania some sections well adapted to sheep raising. For some of our hill-sides it is not best to practice a regular system of rotation cropping, on account of the tendency to wash. Some of these may be made ideal pasture lands for sheep, which, if not overstocked, will grow more and more fertile under the tread of the "golden hoof." The price of wool and mutton fluctuates more than some other commodities, but they usually bring remunerative prices at some time in the year. Wool may be stored with no risk of deterioration and is sure to be in demand at no distant day. The demand for mutton is increasing and lamb—not the cold storage kind—is nearly always at a premium. As the Western ranges are cut up into farms, sheep husbandry will return to some of the rugged hills of our State and give good returns for labor and care bestowed upon it.

Poultry is often put in a class by itself and treated as a separate production from livestock, but its aggregate value, which has been increasing very rapidly of late years, attests its importance and puts it far upon the list of income sources to him who will give the necessary care. No farm is complete without its flock of poultry. Village and town residents, too, whenever they have room have a poultry coop larger or smaller as space and inclination determine. Where other stock can not be kept, poultry may be made to consume the crumbs that fall from the table and make good returns in eggs, broilers, roasters and stews as well as in the enjoyment their care affords.

Secretary Wilson places the yearly product of poultry at 500,000,000 of dollars, truly a magnificent sum surpassed by only a few of the leading sources of income from the farm. The hen is omnipresent. The turkey, goose and duck are somewhat more restricted, but they too may be made valuable where surroundings are congenial.

There is another bird sometimes domiciled on the farm that demands a paragraph. The honey-bee, while not a beast nor bird, may appropriately be classed with the livestock on the farm. A few enthusiasts make a fair income from a bee-yard, and there is no good reason why many more farmers might not add this to their sources of profit and enjoyment, especially since so little care, expense and risk are required to secure at least a supply of honey for the home table. Buckwheat cakes and honey for breakfast on a frosty morning! Think of them!

We have up in Columbia county another species of livestock in a herd, flock or covey of ostriches. Some of them not long from over the sea, they are said to be contented, and apparently to enjoy their new home. It is not anticipated that any of their eggs will come in competition in the market or be put in cold storage for some time to come, nor will they come in competition with the turkey for Thanksgiving roast. Your Committee, however, is hopeful that in the near future sufficient of the birds and feathers may be produced for ladies' hat trimmings so that song and insectivorous birds may be exempt from such use. There may, however, be one drawback to their use in this connection; if a whole bird be mounted the hat will of necessity have to be even larger than it is now.

The CHAIRMAN: You have heard the reading of this paper. What is your pleasure?

MR. HUTCHISON: I move it be received and published with the proceedings.

This motion was properly seconded and duly carried in the regular way.

The CHAIRMAN: The next number on the program is the Report of the Committee on Dairy and Dairy Products, by Dr. M. E. Conard, Chairman.

Dr. Conard's report was as follows:

## REPORT OF THE COMMITTEE ON DAIRY AND DAIRY PRODUCTS

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By DR. M. E. CONARD, *Chairman*

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Dairy statistics of Pennsylvania today reveal rather surprising conditions, notwithstanding the increase in population the number of cows in Penna. is less than a few years back. We also find a quite general decrease in rural population of the State, with today about 55 per cent. of the entire population living in cities, towns and boroughs leaving only 45 per cent. of the people in charge of the principal source of Pennsylvania's food production. Considering that a large proportion of the 45 percent. of agriculturists by reason of location, aptitude or inclination, are following other lines of agriculture pursuits, we find the dairy business is in the hands of a comparatively small per cent. of the consuming public. And we will all agree that there is no more important branch of agriculture than the dairy. It is the one source a farmer has to sell his rough farm crops as a manufactured product, and do the manufacturing himself. The manufactured food on account of its vast importance should bring



him directly into the very best markets of the State. The high cost and inefficiency of labor has done much to influence many farmers to discriminate against the dairy business. The disproportion existing between the prices demanded for commercial feeds and those paid for the products of the cow has narrowed the margin upon which the dairyman must depend for existence until it requires the most strenuous efforts and careful management to keep the head above water. Indeed, I venture the assertion, that if all dairymen in Pennsylvania were called to a financial reckoning today it would be a small proportion that could show a net profit over cost of investment, labor and feed.

There is probably no branch of the farming business where there is so much contention and dissatisfaction existing between the producer and purchaser, dealer or consumer of the finished product as in the sale of dairy products, very largely because the producer is not willing to put forth any special effort to make his wares of better quality and worthy of a better price and put himself in a position of more independence with regard to the sale of his goods. Who ever heard of a man asking \$1 per bushel for 75c potatoes, because if he could get it he would try to raise better ones next year. This is too near the attitude of the average milk producer. He wants the increased price before he improves the quality of the goods. Now these are all rather discouraging and might almost seem to be pessimistic statements, but they are conditions that confront the man who produces for us what should be the most perfect and complete food that God has entrusted to our care, the food that supports the weaker members of our families and the infants. Is it right and as it should be that this most important part of our daily food must be produced at a loss and that so many of our farmers must sacrifice the comforts of their homes and their life work in producing it because it will not yield him a profit? I hope not.

We almost daily hear of some new preparation or product of milk on the market. It is sold entire or in parts. The following are some of the many names under which we find it in trade: Milk, skim-milk, cream, butter, butter-milk, cheese, dried curd, condensed milk, evaporated milk, modified milk, sugared milk, powdered milk, kumyss, milk-sugar, malted milk, and many others. It cannot be for want of a demand for milk and its products that the business is unprofitable. There is no corner of this State so remote as to exclude it from some of the markets offered for the many products of the cow.

Taking general views of the situation, we believe the greatest drawback to profits, exists in the dairyman himself, because he so generally ignores as useless the application of methods in his dairy work and in the selection of his herd, and the feeding of it, that must and will reduce the cost of production just to the extent of his perseverance. But instead he looks to the purchaser to make up the deficiency resulting from his own negligence.

We are glad to notice that statistics show a small, per head, increase in the annual production of the Pennsylvania cow. Just how much of this is due to the extension of dairy education we are at a loss to say. There are other influences that may be at work that may not be noticed. But it does seem to us, I am sorry to say, that



to a considerable extent it may be the involuntary result of the high cost of feed, scarcity of labor, coupled with the tempting prices paid for beef cattle which has resulted in many of the more beefy individuals of the herd being sold out of the dairies to reduce work and feed bills, and if this be true the result would be an unconscious culling process, hence, the per head increase. Now, whether this is the result of systematic culling or involuntary culling we do not know; probably both. But it does prove to us that if we apply the best modern methods in the selection of dairy cows and raise and keep only those individuals that will yield a profit over cost, the individual product would very soon go well above the present figures.

There is just one condition that is the limiter of the dairy profits: namely, ignorance, there are very few people who are not willing and anxious for more information provided they do not have to expose their ignorance in getting it. We do earnestly hope the diligent and persistent dissemination of dairy instruction through the entire State, taking it to those who cannot avail themselves of the instruction and excellent object lessons afforded them at the State College. The teaching how to select or breed up a profitable herd, the growing of crops on the farm suitable for their feed, correct housing and stabling, feeding to avoid waste and loss, stable care, handling and milking, handling and care of the milk, testing and preparing milk for market and selling it for what it really is, are subjects that should be carefully discussed in language and in such ways as can easily be understood and assimilated. Much of this must be done in a very primitive way for it is much like feeding strong feed to a babe, to be assimilated, must be given in small doses.

It should be generally known that the cow is an artificial animal, and to keep her from retrograding requires eternal vigilance, and that her product is the most easily injured of all foods, but if undefiled it is the best.

*Dairy sanitation* seems to be the hardest dose for the less progressive dairyman to swallow. He feels that it is one more straw on the already overloaded back. It is hard for him to believe that there are thousands of active organisms who are responsible for much of the annoyance to the dairyman that are so small that their presence is only revealed to him by the results of their work. This branch of the instruction oftentimes requires much tact.

Now dairy education will do much toward establishing a wholesome respect for the business and will eventually help to narrow the gap now existing between the producer and consumer and to a great extent the margin in price.

The city business man who has his farm and dairy for recreation is an important factor in the intermingling of dairy interests as well as a valuable object lesson to his neighbors.

We believe the question of dairy improvement in all of its phases is a matter of education and much of it must be carried to the farmer at his place of business, if it is to be effective. The national increase in our population must make this fact more prominent.

The CHAIRMAN: You have listened to the reading of this paper. If there is no objection it will be accepted and printed with the proceedings.

The SECRETARY: Mr. Chairman, the thought that comes to my mind—and I think most of you will heartily agree with me—is that many a good thing has been lost because we don't apprehend it at the proper moment. I notice a gentleman in the audience from whom we will be glad to hear. Last week a great show of fruit and corn and livestock was held at Pittsburg. We have with us a gentleman who was present, a gentleman who, in fact, was largely responsible for getting up that magnificent show. He is a modest young man, and sedate, as you will see from the length of his face. I refer to Mr. E. S. Bayard, of whom I will now call to tell us something about that show.

Mr. Bayard then spoke as follows:

### ADDRESS BY MR. BAYARD

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Mr. Chairman and Members of the Board: When I am called out in this way, it does kind of get my heart to palpitating. I'm very much like an old negro I used to know, who said, "If I knowed whar I come from, I'd like to go back home." You want me to tell you about the Fair. Van Norman and such bachelors ought to tell you about the "fair."

I am sorry Secretary Tyson was not here this afternoon to hear the apple session. I noticed a good many "bald'uns" in the audience.

One thing about the apple session that impressed me was, what we should *not* do so much here in the East. You noticed that Professor Stewart threw an apple picture on the screen, and I noticed how most of you were impressed with its beauty. I saw this same orchard out in Lawrence county, and this picture does not begin to show its full beauty; but instead of looking at the beauty of it, we go off into "bug" and "punk" and "rots and spots." We are all inclined to do this here in the East. Out West not one man will show you anything, or tell you anything, about bug, or blot, or rot. He tells you that where he is, is the best place in the world, and he really wants you to think so, and if you stop there very long without saying so, he will invite you to "move on"—and mean it too. Now, we here in Pennsylvania don't want to think of "moving on." I believe in Pennsylvania is really the best place in the world, and here is where I am coming to the Show I am supposed to tell you about.

This Show was gotten up for the purpose of showing city people that Pennsylvania is a great State to live in. We had a show that really was worth having the people of Pittsburg look at. Why did we take it to the city? Well, because over four hundred thousand dollars has gone from Pittsburg alone to be invested in apple orchards in the West, and not one of these people will have an apple orchard. We have had as much as two hundred and fifty thousand dollars go out from close neighbors to be invested in apple orchards in the far Northwest. What is the sense of going 3,000 miles away to raise apples, when we can raise them better at home? That is the reason why we had the show, and it was a good show. There was

one thing that went wrong about it, and that was, it was no good financially. It is not a very deep hole, however, and we will creep out of it. We didn't intercede with the weatherman soon enough, but we will keep on. We had a magnificent show of livestock. Professor Van Norman sent down some splendid specimens, bred until in the fifth or sixth generation we came down to 1/264 pure bred, and they were all excellent producers. We had scores of livestock, and fruit, and lectures all the time, and the beauty of it all is that it was a Pennsylvania show. There was not a thing from outside of Pennsylvania, except one hog (I mean one four-footed hog; I don't know how many of the other kind were there); Oh, yes, and there was a few sheep; and there was nothing shown that we could be ashamed of. I hope it will be the beginning of a great fair, supported by the State. We need it; our State needs it. We need a great many other things, but we need that especially. As Mr. Hutchison says, this show seemed to bring about a better understanding between the city people and country people.

We have had in the City of Pittsburg two land shows; but they were in the interest of the South and Southwest and of Canada. It was simply giving our citizens an invitation to come and see what other states can do. Now let us do it for Pennsylvania. Let us all get together and take for our slogan the motto we have put at the head of our paper—"Boost Pennsylvania." We can do things here, if they can do things there. We can raise apples here, if they can raise them three thousand miles away from here. We can raise cattle and horses on our acres if they can do it there. There is not a single animals, unless it is the sheep, (which has dropped pretty low lately) that can't be raised in Pennsylvania. We have simply gotten out of the habit of doing things. A few years ago you could buy horses at almost any price out West. Several years ago a fellow went out to Kansas City and bought four horses when he thought he was buying one; he didn't know it until he came to take his horse away, and the dealer asked him where to send the other three. You can't do that today. There is not a state where a good horse, today will not sell for more than it cost to produce him. It is the same with cattle. I know when the price of cattle was so low that it didn't pay to raise them. It isn't so today; look at the prices and see. We can do things. The thing for us to do is to stop looking with longing eyes to Canada and the South and boost our own state. Let us go home and "Boost Pennsylvania."

The CHAIRMAN: We will now proceed with the next subject on the program, "Hydrophobia in Its Relation to the Farm," by Dr. W. Frank Beck, of Altoona.

Dr. Beck's paper was as follows:



## HYDROPHOBIA

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By DR. W. FRANK BECK, *Altoona, Pa.*

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I have been prompted to write a paper on this subject on account of the many mad dog scares that has occurred the past summer. Then, again, I believe in educating the people on such subjects as vaccination, tuberculosis, diphtheria and hydrophobia.

If such a course was carried out as it should be, there would be less trouble and many lives would be saved. I am reminded that we are from the same people that over one hundred years were burning witches at the stake. There are thousands of people die every year of typhoid, when every case could be prevented, if we were properly educated to care for our bodies.

It is terrible to think that one-third of all the children die before they reach the age of six, for the same reason that I have just stated. Every year, over 500,000 American people die needlessly. There is no really proper energetic National, State or local effort to fight many of these diseases that kill so many people.

### DESCRIPTION

Hydrophobia is a specific and infectious disease, common to all forms of animals, which may be communicated to many by direct inoculation. It is characterized by high fever, spasms, with paralysis, and always ends in death.

Pasteur has found poison abundantly present in all the nerve centers of the body, and has transferred the disease by taking bits of brain substance derived from an infected animal and inoculating them into healthy subjects. The usual mode of infection in man is through the bite of a rabid animal, the virus being contained principally in the saliva, and in an immense majority of cases the dog is the offending party. The cat, wolf, cow and horse also suffer from this dreadful disease, and in rare instance they communicate it to man.

The history of one bitten by a mad dog is something like this: The period in which you are liable to become mad after receiving the wound is six weeks to three months. The usual premonitory symptoms are fever, headache, loss of appetite, sleeplessness, great depression of spirits, and sometimes darting pains radiating from the seat of the bite and the glands that are near the wound become swollen.

The invasion is in two stages: First, the stage of excitement, the patient wearing an expression of the most intense anxiety, and the special sense exhibit the most keen vigilance, such as a draft of air or noise of any kind may cause great disturbance or violent spasms. Quite early, the mere sight of water is dreaded by the patient. This symptom is so prominent that has given the name to the disease—Hydrophobia. The mere sight of water causes great spasms to the throat, the patient having thirst that he cannot control. The muscles

of the mouth exhibit convulsive movements, causing the patient to make sniffling sounds, and foaming saliva may be ejected from the mouth.

The second stage, is the paralytic stage, the patient passing into actual unconsciousness without spasms. This lasts 18 hours and always ends in death.

How shall we know if one has Hydrophobia? If the patient has fever, shows great uneasiness after he has been bitten by a dog and at the sight of water, goes into spasms, there is great indication that he has hydrophobia. This is most important, for few cases recover when once left to develop.

#### TREATMENT

Upon reception of a case of dog bite, thorough disinfection, followed by cauterizing of the wound with caustic is a measure that can be quickly carried out.

As soon as possible after the bite, place the mouth to the wound and suck out the poison. This is a method much used in the dissecting room by medical students and is most effective, as it eliminates the poison before it enters the circulation.

#### PASTEUR TREATMENT

This is a precautionary measure of the most importance. Pasteur showed that the virulence of the virus which he obtained from the nervous system, is modified by passing it through animals, the same as vaccination. He also found that if fragments of the spinal cord were suspended in a dry atmosphere, they would gradually lose their strength and finally become inert.

From a bit of the cord, treated in this manner, a medicine is made in the form of an emulsion. This is used for inoculation in man and constitutes the great Pasteur Treatment, that we hear so much about. If you were bitten by a dog that you thought was mad and sent to one of the Pasteur Institutes, your treatment would be something like this: The first day you would be inoculated with a medicine made from a cord 14 days old. You would be inoculated for nine days, each day with a cord one day fresher.

The success of the Pasteur treatment is almost universally attested, and the results have been marvelous. The patient should, however, be sent to the institution at once, as delay tends to diminish the protective power of the inoculation.

The Pasteur treatment is not used after the symptoms develop, but it must be before. After that it defies all known methods of treatment.

What I have said pertains largely to the professional side of this subject. Its relation to the farmer has a different story to tell. Any disease that effects not only the domestic animals, but his family as well, must indeed be of much interest.

I would not dare to say that there was no such disease as hydrophobia; but on the other hand, will say that it is a very rare disease in our State. In many years of practice, I have never seen a case, either in man or dog though treating many cases of dog bite

under all kinds of conditions. To show you still further how extremely rare it is, I have interviewed 40 physicians whose practice has extended over many years and not one of them has ever seen a case of hydrophobia. Dr. Osler, the most widely known investigator, reports that he has only seen two cases since 1867. I could cite you to other ones of high authority that give the same history of this dreaded disease. There is scarcely a day that we do not hear of some mad dog scare, but they are mostly fakes and end in the poor dog getting the worst of it.

While working in a State laboratory some years ago I went with eminent physicians to kill a dog that had been reported as dying with hydrophobia. This dog was in a wealthy section of the city and had almost caused a riot before we had reached the place. Our object was to obtain the brain so as to examine it in the laboratory. We were fully armed for such an expedition. When we saw the dog every one agreed that this was indeed a true case of hydrophobia. The dog was killed, his head cut off and to our surprise we found a sharp chicken bone in his throat. In a few minutes we all slipped off, with our heads down, much ashamed for what we had done.

In another case where a dog showed symptoms of hydrophobia a thorough investigation revealed the fact that the dog had not had water in any form for 20 days.

During one of the very warm days this summer, I had a collie dog under close observation and I found that in 6 hours he had drank water 12 times. Among country people it is the custom to see that all the animals on the place have been watered, but the dog is left to look out for himself. I want to say that if there is any thing that will make a man or women show signs of hydrophobia, just let them do without water for 20 days.

Every dog that is frothing at the mouth, snarling and biting, or acting strange in any way, does not have hydrophobia by any means. You must remember that when a dog has pain or is distressed, it is as natural for him to bite as it for the horse to kick or for the cat to scratch.

Along this line, let me give you an example that I know to be true, and it first started me to thinking on this subject. It happened at my home while I was living at 1214 8th Ave., Altoona. I had a young collie dog. One afternoon he was in the backyard and became violent, jumping in the air and rolling on the ground, as well as clawing at his throat. Everyone that saw him, declared that he was going mad. Mrs. Beck was the only one that was at home at the time. Against the protest of the crowd that had quickly gathered, she firmly held his head between her knees pulling his mouth open, looking down, saw a large bone wedged in his throat. She took a stick and pried it out which of course, ended the trouble. Now the point that I wish to make is this: **With** the excitement that it made, within a few minutes some one **would** have turned in a mad dog scare. The police would have arrived on the scene, the dog would have been shot, and the reports gone around that a dog had been killed with hydrophobia.

Many people take no precaution as to what they feed their dogs, imagining that they can swallow anything, when in reality such food as sharp chicken bones are extremely dangerous. If you have any



doubt as to whether sharp chicken bones will produce symptoms of hydrophobia, just try eating some. You are about at able to swallow them as the dog.

I am giving you these practical examples for the purpose of showing, that there may be other conditions effecting the dog producing symptoms, in most every case, similar to those of hydrophobia.

Another thing I wish to mention. In case a dog bites you do not leave them kill the dog at once. Tie him up so you can see if he will develop hydrophobia. By at once killing the dog, you destroy your best means of diagnosis.

The CHAIRMAN: What shall be done with this paper?

On motion, properly seconded and duly carried in the regular way, it was ordered to be filed for publication with the proceedings.

The CHAIRMAN: Next in order is a lecture on "Nitrogen—Its Forms and Sources," by Dr. Charles M. Stoddart, of State College.

Dr. Stoddart spoke as follows:

## NITROGEN: ITS FORMS AND SOURCES

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By DR. C. W. STODDART, *State College, Pa.*

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"Nitrogen is, after water, the greatest factor in the creation, growth and working of nature; to bind it and be its master, that is the problem; to make use of it, therein lies real agriculture; to bring its sources which are inexhaustible into service, that it is which creates wealth."

Ever since Schultz-Lupitz, the pupil of the great Baron Von Liebig, made that statement some fifty years ago, "the nitrogen problem" has disturbed statisticians and even scientists from time to time; for nitrogen is a most necessary and useful element in human life and progress. It is useful in the manufacture of many synthetic medicines and poisons, very powerful medicines and poisons they are, too; beautiful dyes; gun-powder; celluloid; nitro-glycerine; collodion; gun-cotton. It is a necessary constituent of human foods, for it is an integral part of every living cell, and of most bodily tissue such as muscle, skin, hair and bones.

But what is the source of this nitrogen that is so important?

For the manufacture of most of the commercial products containing nitrogen, nitric acid is used. For example, gun-cotton is ordinary cotton treated with nitric acid; collodion is a form of gun-cotton dissolved in alcohol and ether; nitro-glycerine is glycerine treated with nitric acid. Nitric acid is made from sodium nitrate. Sodium nitrate is mined in Chili and is being consumed at the rate of some 2,000,000 tons per year. Statisticians tell us that there is not enough to

last more than 40 or 50 years longer. In other words, our commercial products, so useful and even necessary, are almost wholly dependent on this supply of sodium nitrate. Hence, the hue and cry about the nitrogen problem.

But what we as farmers are particularly interested in, are the sources of agricultural nitrogen which helps make our foods. Directly or indirectly food nitrogen is obtained from crops, and the source of crop nitrogen, then, is our present inquiry.

Chemically nitrogen is a gas, colorless, odorless, rather lazy, for it does not combine easily with other elements. It forms four-fifths of the air we breathe. On every acre of the earth's surface there rests 35,000 tons of nitrogen. But only in combination with other elements is nitrogen of any value; for example in nitro-glycerine as a liquid together with carbon, hydrogen, and oxygen; in sodium nitrate as a solid together with sodium and oxygen. Only as a nitrate, that is in combination with oxygen and some base like sodium or calcium, is nitrogen of use to the ordinary crop plants.

In the soil, nitrogen occurs as complex organic compounds resulting from the decay of plants or animals—as humus, if you will. Bacteria act on this nitrogen and convert it to the nitrate form with the help of lime or some other base derived from the decomposition of rocks. The crop plants for the most part, when they are plowed under returns to the soil only then nitrogen taken from the soil during their growth. There is no gain in nitrogen. But legumes, clover, alfalfa, peas, beans—have growing on their roots colonies of nitrogen fixing bacteria which can take nitrogen from the air, and make it combine with other elements in such a way that the legume plant can make use of it, and by its decomposition furnish available nitrogen to succeeding crops. Estimates based on analyses have shown that in this way there may be added to the soil anywhere from 40 to 200 pounds of nitrogen per acre in excess of what may have been present before. This gain in nitrogen is made by merely plowing under the stubble remaining after a hay crop, or such growth as may have occurred after the crop was removed and before the spring plowing.

This is one of the most important sources of nitrogen for our crop plants: Atmospheric nitrogen made to combine with other elements and added to the soil without any labor other than the planting of the seed,—and the hay is obtained in addition to more than pay for that labor.

Another source common to every farm is barnyard manure, which is one way of returning to the soil only what has been removed therefrom, unless the stock is fed on purchased material which comes from another soil,—a case of robbing Peter to pay Paul.

The principal sources of agricultural nitrogen is commercial fertilizers. In considering these forms, perhaps it would be well to divide them into three classes:

First. Those immediately available.

Second. Those very quickly available.

Third. Those slowly available.

Of the first class *Sodium nitrate*, or Chili saltpeter, is the chief representative, although not the only one as will be shown a little later. Sodium nitrate has its nitrogen in such a form that the plant

can take it up and use it in making plant tissue and seeds, just as soon as the nitrate dissolves in water, and that is as soon as it applied to the soil. This form of nitrogen is immediately available, and all of it is available at once. The sodium nitrate of commerce, containing 15-16 per cent. of nitrogen, is made by solution and crystallization of an impure material called "caliche" which is mined in large quantities from a high, dry plateau of Chili. The theory of its formation is that nitrifying bacteria—those bacteria which make nitrates in the soil—acted on large quantities of decaying vegetation which grew ages ago in the mountains above this arid plain. The base supplied in this case was sodium, so there was formed sodium nitrate instead of calcium nitrate, as would be the case in our own soils. Rains washed the sodium nitrate so formed down into the desert where the water evaporated, leaving the nitrates to accumulate.

Of the second class *Ammonium sulphate* is the principal representative. This material *possibly* can be used by the corn plant just as it is, and is hence immediately available, but for most crops certainly it must first be changed by bacteria to nitrates. This process is very rapid, for in the change of complex organic matter to nitrates, the formation of ammonia is the first step, and the hardest step. The rest of the process is easy and rapid. Consequently the nitrogen of ammonium sulphate is very quickly made available to plants.

Ammonium sulphate is made principally from the ammonia given off in the making of coal gas or coke. The ammonia is absorbed by sulphuric acid, and crystallized out. It contains 19-20 per cent. of nitrogen. Every coke oven can be equipped with the apparatus to make ammonium sulphate at very little expense, relatively speaking, and the product will more than pay for the expense of the retorts.

The third class comprises those substances containing nitrogen in complex organic forms which have to undergo decay and bacterial change in the soil before plants can make use of their nitrogen. In many cases the decay is very slow, that is, the initial decay and change to ammonia is slow. Of these very slow acting fertilizers,—these inert nitrogen carriers,—Doctor Frear has told you, and stated how they can be made more quickly available—I refer to *leather*, *hcofs*, *hair*, *garbage tankage*, *peat* and so forth.

Other forms which are quicker acting are *dried blood*, containing 10-14 per cent. of nitrogen; *fish scrap*, 7-9 per cent. nitrogen and 6-8 per cent. phosphoric acid; *tankage*, refuse from slaughter houses, not garbage tankage, containing 5-20 per cent. nitrogen and 1-14 per cent. phosphoric acid; perhaps there might be mentioned *cottonseed meal* and *linseed meal*, running about 5 per cent. nitrogen. These last products, however, are better fed to stock and the manure applied to the land.

Barnyard manure, already mentioned above, would come under this class of slow acting fertilizers for the most part, although some of its nitrogen may be in the ammoniacal form and very quickly available.

There remains two products which should be mentioned now:

*Calcium cyanamide* or *lime-nitrogen*, a substance made in Europe by heating in an electric furnace a mixture of coke or charcoal and



lime over which is passed a stream of nitrogen. The nitrogen is obtained with but little trouble from the air. The final product is a compound containing 17-20 per cent. nitrogen which decomposes on treatment with water to form ammonia. This of course is what happens when lime-nitrogen is added to the soil; and the ammonia can very quickly be changed to nitrates for plant use. It is a fertilizer of the second class, can be made cheaply, and is almost as good a fertilizer as sodium nitrate.

*Basic calcium nitrate* is a fertilizer now on the European markets to some extent, as cheap as, or cheaper than sodium nitrate and exactly as good, containing about the same amount of nitrogen, 13-15 per cent. It is made in Norway by passing air through a furnace containing an immense disc-shaped arc, some five or six feet in diameter, produced by a very powerful electric current between water cooled copper electrodes. The disc-shape of the arc is obtained by an immense electro magnet which pulls the ordinary arc out of shape. The action of this intense heat on the nitrogen and oxygen of the air causes them to unite to form oxides of nitrogen. These oxides of nitrogen are passed up through granite towers full of crushed quartz down through which trickles water. Nitric acid is formed. This nitric acid can be concentrated and sold as such, or it can be neutralized by lime and the basic calcium nitrate formed.

We have here a process which makes nitric acid for use in commerce, and nitrate for use in agriculture. Air is the source of nitrogen for useful articles and for necessary crops. We can be independent of the naturally occurring instincts of soda; its disappearance need not cause any anxiety. And more than this the farmer has in the bacteria on his clover and alfalfa roots an agency for utilizing atmospheric nitrogen which is cheap, efficient and reliable.

The nitrogen problem is solved; we have bound it and become its master; we have brought its inexhaustible sources into service.

The CHAIRMAN: You have heard this paper read. What shall be done with it?

GENERAL BEAVER: I move it be received and published with the proceedings of the Board.

This motion was properly seconded and carried in the regular way.

The CHAIRMAN: Now, I believe the meeting is open for discussion.

MR. BAYARD: I would like to ask the Professor at what price the last two commercial nitrates can be bought in the market?

DR. STODDART: I cannot answer that. I understand that the Basic Calcium nitrate is sold in London at about the same as the Sodium nitrate. I understand there is not enough in the market to supply the entire market, but it is constantly increasing. For instance, in Norway they are putting up two immense factories, which will materially increase the supply.

MR. BAYARD: Do you know if they have large lime deposits, or coal deposits, or do they expect to produce it from their furnaces?

DR. STODDART: Lime deposits, yes, but coal deposits are not necessary. Pennsylvania is in position to produce it very largely.

MR. CREASY: I understand that the State of Ohio expects to be able to produce it at a profit from the smoke from the iron works.

DR. STODDART: Yes, sir.

A Member: Figuring one hundred pounds of soda and sixteen pounds of nitrate, what effect would this have on the soil?

DR. STODDART: You would have to include the three elements of soda, nitrate and oxygen; I cannot tell you the percentages, but it runs something like 25 of soda, 14 of nitrogen, and 48 of oxygen.

A Member: But how would it affect the soil?

DR. STODDART: The long continued use of Soda nitrate takes up the nitrogen and leaves an alkali soil; it leaves soda carbonate which carries no acidity and leaves an alkaline tendency.

A Member: Then in connection with South Carolina rock, the one would counteract the other?

DR. STODDART: Yes, that would be the tendency in the long run. If you cross sodium carbonate and acid phosphate, you lose the nitrate.

DR. CONARD: If I had a moment, I would like to emphasize some of the statements made by Dr. Beck, relation to the fake, hydrophobia.

The statement of the Doctor conveyed the impression that there is a tendency to choke in hydrophobia. There are a great many mistakes of that kind made both ways. Oftentimes we have such a dread of hydrophobia, that people are rather apt to lose their heads, and it is a fact—perhaps the best thing would be to go a little further and describe the symptoms, and in order that we may recognize them, let us take a few minutes.

It is a fact that there is a time in the early symptoms of hydrophobia, that it looks something like a boy about to be choked. The symptoms come on slow, just as Doctor Beck has described them. In the case of a human patient he will have a fever and if it be a dog, he will have more affection than before. He feels that he is sick, and wants your protection, but is still conscious and able to eat. A little later his eyes become very much blood-shot, but he is still as affectionate as ever, and that is where the danger comes in. In a short time paralysis of the throat sets in and causes the lower jaw to drop a little, perhaps one-fourth of an inch, perhaps an inch, and he is unable to get his mouth shut. There is no sign of shaking or other trouble, simply his mouth does not shut, because his throat is paralyzed. In large dogs, such as the St. Bernard, or Newfoundland which are of a nervous type, they nearly always go through the paralytic form while the little dogs, like the terrier, usually are attacked with the spasmodic form very early. It is in the big dog in his paralytic stage, when you sympathize with him because

he has been so good, so true, that there is the danger. If he is choked, he will tell you so clearly enough. In the paralytic form of hydrophobia, the dog may be entirely quiet, possibly for quite a while, but at any moment something is likely to excite him, and he will fly into a fit. As a practicing veterinarian, whenever any one comes to the house to see me for a dog, I have left instructions at home to have them keep that dog chained until I can see him, absolutely away from all people. That is just the time the danger occurs. A little precaution in time will often save a great deal, and I think we should all become familiar with the early symptoms so as to be able to in a measure recognize the disease when it appears.

The CHAIRMAN: Perhaps the discussion has been carried on long enough. I see there are some sleepy heads in the audience, and I don't know how much to fine them. The new Chairman has not limited the amount—

The SECRETARY: There is no limit.

The CHAIRMAN: Perhaps it will be well to bring this discussion to a close.

The SECRETARY: Mr. Chairman, will you allow me to state that we cannot have the pleasure of listening to Dr. Marshall tomorrow morning. He was operated on yesterday for appendicitis, and while he is getting along very well, he will not be able to be here, and so far no report has been handed me to read for him.

MR. J. ALDUS HERR: The Special Committee on Legislation will please meet in Mr. Martin's room before ten o'clock tomorrow morning.

The CHAIRMAN: You will please take notice of this arrangement. If there is nothing further, the meeting stands adjourned until tomorrow morning.

Adjourned until 9 A. M. Thursday morning.

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Harrisburg, Pa. Thursday Morning, January 25, 1912.

Mr. Schultz in the Chair.

The CHAIRMAN: The meeting will please come to order. We will proceed with the program. The first subject on the program is the Report of the Committee on Poultry, by W. Theo. Wittman.

MR. HUTCHISON: That report was made yesterday, Mr. Chairman.

The CHAIRMAN: Next comes the Report of the Veterinarian, by Dr. C. J. Marshall.

COL. WOODWARD: Before proceeding with this program, it has occurred to me and to some others that it would be well to have a Committee on Resolutions by which the resolutions that come up



should be digested and revised. I move you, therefore, that hereafter there shall be included in the regular standing committees, a Committee on Resolutions, to be selected by the Executive Committee, and reported in the same manner that the other standing committees are reported.

The reason for this is that a resolution may be offered and passed, often hastily, that is not befitting the dignity and standing of the State Board. It seems to me that this committee should be appointed, and such resolutions as are desired, be brought before the Board, revised and amended, if necessary, by the Committee before they are passed. I think that in this way they will be more representative of the sentiments of the Board, than if passed without such consideration. I would ask that the motion be brought before the house.

The SECRETARY: I second it.

Having been properly moved and seconded, this motion was duly carried in the regular way.

MR. BRONG: That resolution cannot successfully be fulfilled for the resolutions that will be offered at this meeting, can it?

COL. WOODWARD: I think that possibly it can, if the resolution is sent by the Secretary to the Executive Committee which is now, or will be shortly, in session in the Department of Agriculture.

The SECRETARY: Your idea is that this resolution and motion is sent to the Executive Committee, so that that Committee can do its duty at once, by appointing this Committee on Resolutions?

COL. WOODWARD: That was my thought sir, when I offered the resolution.

MR. SNAVELY: The gentleman from Centre does not designate the number.

COL. WOODWARD: That can safely be left to the Executive Committee, I think.

DR. CONARD: It does away with the Committee on Resolutions usually appointed at each meeting?

COL. WOODWARD: Yes, sir. It gives it dignity and standing.

MR. BRONG: Will there be a Committee on Resolution appointed at this meeting?

The SECRETARY: I doubt it, because this motion calls for its appointment by the Executive Committee.

MR. SNAVELY: I think that committee will be appointed within the next half hour, because the Executive Committee will go into session very shortly, and can appoint this Committee on Resolutions at once.

COL. WOODWARD: If that motion has been passed, I see no reason why it should be put into working order this afternoon.

MR. BRONG: I have a resolution to offer at this time. I with others, was very much interested in the discussion of the fertilizer question yesterday afternoon. We have a fairly good fertilizer law in this State, but it was yesterday admitted to be of little value, and the buyer of commercial fertilizer has been calling for a good many years for better protection. I, therefore, offer this resolution.

*"Be it resolved* by the State Board of Agriculture in session at Harrisburg, Pennsylvania this 25th day of January, 1912, as follows:

That we earnestly recommend at our next Legislature, such legislation as will give the purchaser of commercial fertilizers positive knowledge of the source or sources of the nitrogen, phosphoric acid and potash contained in said fertilizer, by requiring the manufacturers to make specific statements of such source or sources on each package placed in the market.

*Resolved further*, That refusal to comply with the statute after enactment, should be made punishable upon conviction by a suitable fine and disbarment of any brand so marked, or any other brand of same plant food-content by such convicted company, from sale in this Commonwealth.

This resolution was given to the Committee on Resolutions about to be appointed by the Executive Committee.

The CHAIRMAN: The next subject on the program is the report of the Veterinarian, by Dr. C. J. Marshall.

The SECRETARY: I made a statement yesterday that Dr. Marshall is unable to be here. He is in the hospital, having just undergone an operation for appendicitis.

The CHAIRMAN: The next subject on the program is the Report of the Sanitarian, Dr. W. H. Banks. He does not appear to be here, so we will proceed with the next number, which is the Report of the Microscopist and Hygienist, Prof. J. W. Kellogg.

Prof. Kellogg delivered the following address, which was accompanied by a number of interesting and instructive illustrations:

## REPORT OF THE MICROSCOPIST AND HYGIENIST

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By PROF. JAMES W. KELLOGG

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At our meeting last year an attempt was made to illustrate how the microscope has been of great aid to the scientist in the investigation of food adulterations, and the detection of the source of disease, and to bring before you the importance and need of a law which would regulate and control the sanitary conditions of the communities in which we live.

It is a well established fact that a great deal of ill health and many diseases have been caused by the unsanitary manner in which many of our cities and towns have been conducted. The source of the water supply has not been protected. Creameries and milk depots have not been kept clean. Sewers have been left open and refuse matter and all sorts of filth have been left uncovered and exposed in the streets, alleys and back yards. This state of affairs has not only existed in the past, but may be found to exist to-day, if one should take the trouble to investigate.

It is right and proper that we should have pure and unadulterated food, that we should be so protected from fraud as to be able to obtain food which is wholesome and free from injurious or poisonous substances; but it is much more right and proper that the source of food contamination be eliminated, and that markets, cafes and restaurants where food is sold and prepared for consumption, be so clean and sanitary that no fear of sickness or spread of disease need be entertained. If we are to have these clean and sanitary places, it is necessary that the energy of every citizen be devoted to a campaign for cleanliness, and that we see to it that not only our streets and neighbor's premises are free from filth, but that our own back yards are in the proper condition to prevent the spread of disease.

We know from sad experience how often a whole community has suffered from the outbreak of an epidemic of some dread disease, and how often the cause of the trouble has been traced to a polluted stream, an uncovered sewer or the presence of filth of all sorts, in which is bred the agencies known to be capable of spreading disease. It has been proven that one of the greatest agencies engaged in the spread of disease is the house fly. It does not seem possible that so small a form of life could cause so much trouble, but all the facts in the case point to the fly as one of our greatest enemies. Anything which is conducive to the existence of the fly or the conditions which promote their breeding is, therefore, responsible for the spread of disease. The favorite breeding place of the fly is in horse manure and other excrementitious matter, and many other forms of decayed animal and vegetable refuse. It would not be stating the case too strongly to say that any city, town or person permitting the breeding places of flies to exist, is directly responsible for the spread of sickness and ill health. "Eliminate the cause and you eliminate the effect," and to eliminate the breeding places of flies is what must be done if we expect to succeed in any campaign against the fly. It has been demonstrated by scientists who have made exhaustive experiments, that the house fly can and does spread typhoid fever, dysentery, tuberculosis, Asiatic cholera and is capable also of transmitting leprosy, erysipelas and smallpox.

There are a great many species of the fly, but the one which we are concerned most about is the common house fly. This insect in its development from the egg to the adult, passes through several complete changes, "each unlike the other: The egg, the larva or maggot, the pupa or resting stage and the imago or full grown insect." Dr. L. O. Howard, of the Bureau of Entomology of the U. S. Department of Agriculture, reports that the fly commonly lays its eggs upon horse manure, about 120 eggs being deposited in one mass, usually in several layings. At the end of twenty-four hours the larva or maggots



are hatched. They begin feeding at once and thrive and grow for from five to seven days. At the end of this time, they crawl into the loose ground or under dry boards or into dry places and enter the pupa or resting state. This period occupies from five to seven days and in some cases a little longer. Then the fly comes forth fully developed, the total life round requiring, therefore, from ten to fourteen days. This time is influenced somewhat by climatic conditions, requiring a shorter or longer time, according to the cold or warmer temperatures. During the winter the adult fly hibernates in some warm or favorable place and becomes active again in the spring. The size of the fly is also influenced to some extent during the larval or growing period. If the larva are well fed, the flies will be full grown.

Prof. Wm. B. Herms, of the University of California, reports that he has estimated the number of larva which had hatched in four samples of manure, weighing in all fifteen pounds, and that 10,282 were found present. This would average about 685 larva per pound. By estimating the weight of such a pile of manure, astonishing figures can be obtained. Many other similar experiments have been made, and it is easy to understand the reason why such great numbers of flies exist in the neighborhood of stables or places where decaying vegetable or animal matter is exposed. The way in which the diseases mentioned are spread, is by the flies migrating from one place to another, alighting upon all sorts of refuse material to obtain their food and then, of course, going into the house, crawling over our food, eating utensils, getting into milk and water, and also by crawling over our bodies and sometimes getting into the mouth. They are especially dangerous to infants where bottles and milk are not kept covered or away from them. The legs and bodies of the flies are covered with small hairs to which germs easily cling.

Prof. Herms also reports that the number of bacteria which a single fly may carry will reach all the way from a few hundred to several millions and these germs, under favorable circumstances, will live as long as twenty-three days. Early in the fly season the numbers of bacteria are comparatively small, while later, this number increases greatly. The mouth parts of the common house fly are not adapted to biting or stinging as is commonly believed. Other species of the fly, one of which is the stable fly, has a mouth part so constructed as to be able to pierce the skin. This form of insect can inject disease into the blood directly. The danger in the flies which infest our dwelling places lies in their power to carry germs on their bodies to food as above stated. Typhoid fever is one of the most serious diseases of man, and because the fly has been so energetic in transmitting this ailment, Dr. Howard has called this insect the "typhoid fly." Typhoid fever has been prevalent in many of our army camps, and it is now known that it was caused by the large number of flies, which, in turn were caused by the unsanitary manner in which the camps were cared for. During the Spanish American War, the Army Surgeons were especially energetic in their campaign against sickness, and by eliminating all sources of breeding places, typhoid fever was reduced to a minimum. From all the information we can gain on the subject, it is clearly evident that if we are to

wage a war against the fly and enter into the "Swat the Fly" campaign, it will be necessary to go further than killing all the adult flies and to prevent their coming into existence.

The Health Officer of every community should see to it that every section of the town or city is kept scrupulously clean, if the sickness in that town or city is to be reduced to a minimum. Many methods have been suggested for taking care of the refuse material, such as building closed receptacles in which to place refuse of all sorts, removing it from time to time in closed wagons, and by the use of chloride of lime, solution of Paris green, kerosene and other similar substances.

Bulletins have been issued by the United States Department of Agriculture, in which instruction is given along these lines, and these bulletins can be obtained by writing to the Superintendent of Public Documents at Washington.

The amount of money which has been spent for screens, fly paper and fly poisons in the United States would amount to many thousands of dollars, and the number of deaths, which cannot be estimated in dollars, which can be directly traced to the fly, will reach into the thousands. The value of real estate in fly infested districts has been materially reduced, and wherever this pest thrives in great numbers, it is easy to understand what an enemy they are. It is earnestly hoped that a strenuous campaign will be waged in every community against the unsanitary conditions which promote the breeding of flies, and that no effort will be spared to get rid of this pest and protect the lives of our people.

DR. CONARD: Did you notice any difference in size between the small fly that lights on the cow's horn, and the house fly?

PROF. KELLOGG: Yes, sir, that is a different species. There are over a thousand different species of flies, and the fly you refer to is not an undeveloped fly, but a distinct species.

DR. CONARD: How far will a fly travel from his home?

PROF. KELLOGG: There have been instances where they have been known to cross to Europe, following a ship.

DR. CONARD: But, ordinarily, in search of food, I mean.

PROF. KELLOGG: Oh, several miles, I suppose. The motor muscles are one-quarter of the weight of the fly, so you can see how strong they are.

MR. HUTCHISON: I understand from your report that much of the danger can be overcome by keeping the manure covered?

PROF. KELLOGG: Yes, sir.

The SECRETARY: Then the danger can be largely eliminated if the manure is taken out at once?

PROF. KELLOGG: Yes, sir.

MR. JOEL A. HERR: Plaster or South Carolina rock covered over it, will that have any effect?

PROF. KELLOGG: Not so much.

MR. J. ALDUS HERR: What would be a practical way of taking care of the manure where you have forty or fifty cattle?

PROF. KELLOGG: Spread it as soon as possible, although I admit it is a big problem.

MR. JOEL A. HERR: You don't want to use lime because it dries up the ammonia, and you don't want to use kerosene because it kills the crop.

PROF. KELLOGG: Spread it at once, although that is a problem that is largely individual. Of course, on a large farm, I think the idea is to spread manure as soon as possible. This is important in several ways.

A Member: Did you make any investigation as to whether there would be any flies where the manure is hauled out at once and spread?

PROF. KELLOGG: No sir, I never have, but I think there would be no question about it. You notice the mouth there. It is possible that the fly takes his food only in liquid form. If it cannot get it in liquid form it puts out some slimy substance with which it covers the dry food.

A Member: How does the fly manage to get through the winter?

PROF. KELLOGG: I think they hibernate; most of them come through quite a severe winter. Up in Massachusetts, I am told, a man discovered quite a number of them in his cellar. They have to thrive, because we have them every year.

A Member: I have noticed in taking out old sacks in the spring, that they would be full of them.

The CHAIRMAN: What is the pleasure of the meeting, concerning this able report to which we have just listened?

MR. HUTCHISON: I move it be received and published with the proceedings.

This motion was properly seconded and duly carried in the regular way.

MR. J. ALDUS HERR: Mr. Chairman, I would just suggest that the Committee on Legislation meet in Mr. Martin's room at ten o'clock.

DR. BECK: The Executive Committee will meet at once in Secretary Critchfield's room.

MR. JOEL A. HERR: I move that while we are here, we proceed to discuss a place for the summer meeting.

This motion was properly seconded and duly carried in the regular way.

The CHAIRMAN: We are ready to entertain invitations to different places for the summer meeting.



MR. J. ALDUS HERR: I nominate Bradford county—Towanda.

MR. KERRICK: I second this nomination.

MR. SHOEMAKER: I nominate Greensburg, Westmoreland county. We can have the use of the Court House and have good hotel accommodations.

MR. TAYLOR: I second the nomination.

MR. BRONG: I want to name a place which has become famous, not only in this State, but throughout the Eastern United States as a summer resort—Stroudsburg, Monroe county.

DR. BECK: I second it.

The CHAIRMAN: Any other nominations? If not we are ready to entertain a motion to close the nomination.

MR. JOEL A. HERR: I move the nominations close.

This motion was properly seconded and duly carried in the regular way.

MR. KERRICK: A year ago at this time, I think, one of my friends from Lancaster county said to me that he would be glad if we would allow the summer meeting to go to Lancaster without question, and I told him that I was not anxious to make trouble—that a year later would do me very well. We went down to Lancaster and had a good meeting and enjoyed it very much.

We also have a good Court House, as the member from Westmoreland has said, and facilities for accommodating you, and some beautiful scenery along the Susquehanna River, near the York State line. We will be very glad to entertain you at Towanda. We make a good deal of dairy butter, and I want to say to you, gentleman, that we make the best butter in the world. The Navy gets all its butter from Troy. We will try to entertain you well, and hope to see you all at Towanda. We will give good butter and buckwheat cakes if you want them.

The SECRETARY: What! in May?

The CHAIRMAN: Any other remarks? If not we will proceed to the selection of a place.

The SECRETARY: I will call the roll, and the members will please answer distinctly, so that we may get the record correctly.

The roll-call showed the following result:

Towanda, twenty-nine; Greensburg, nine, and Stroudsburg one.

MR. SHOEMAKER: I move we make it unanimous for Towanda.

DR. BECK: I second that motion.

This motion was duly carried in the regular way, and Towanda was unanimously selected as the place for the summer meeting.

MR. HUTCHISON: That last report of Prof. Kellogg's, I would just state that the City of Harrisburg is doing a great work in de-

stroying the fly. Mr. Jones' wife, here, is at the head of the movement, and they have offered two premiums, one to the boy and one to the girl, that will kill the greatest number of flies.

The CHAIRMAN: I was just thinking that it might induce them to raise flies instead of killing them.

MR. HUTCHISON: Now, Mr. McFarland is taking a great interest in the matter; and I tell you that farmers should take a lesson from these city people in not allowing their manure and filth to accumulate round the premises. We built a new house six or eight years ago, and we thought we would have no flies; we had our horses near; we didn't know at that time of the connection between flies breeding and manure, and we were over-run with flies, and could not understand how they came there. Now the farmer can help the housewife by simply doing his duty in the removal of the breeding places of these pests. I want to commend the good women of this city for the good work they have been doing under the leadership of Mrs. Jones.

MR. DeWITT: I am from Tioga county. We have a great many creameries and condenseries in that county, and you would be surprised at the carelessness manifested there. Some of us may possibly be clean ourselves, with our stables and our homes, but our neighbors may overdo the matter the other way. It is a curiosity to me to know how to get to work to eradicate it. You may do your part, but if your next door neighbor, not more than fifty or a hundred yards away from you, is so dirty that it is impossible for a man to sit down to eat a meal in the house without being carried away by the flies, how are you going to prevent these flies from coming over to your place? I think there should be some law for the condenseries and creameries if nothing else.

The CHAIRMAN: I think so too, and I think the farmer should be compelled to take his manure out on the field.

A Member: There are flies where there is no horse manure. I live in a small village, and our Town Council constituted themselves a Board of Health, and they make it their business to inspect the back yards several times during the summer, and if there is any place where the flies can breed, the owner receives a very strict notice and he has to pay attention to it. If all communities would do that, we would soon overcome the fly.

The CHAIRMAN: If you go along the city streets, you will notice the garbage pails stand out half the day, uncovered. That is where the flies breed, and it is a matter which should receive attention.

MR. GEARHART: The American people, as a rule, are opposed to be compelled to do anything. There are some things that can be enforced, but there are others which I sincerely question, and among them is the point made by the member, of compelling the farmer to haul out his manure at once. There are instances where it is almost impossible to do this. I think the best thing to do is to educate

our people, through meetings like these, through the Grange, through bulletins, through the pulpit, if necessary. Teach our people to be cleanly instead of compelling them to be so.

A Member: I am glad to hear these discussions. I think it is a very important topic, and one we should take with us into our homes and look into at once.

The CHAIRMAN: I agree with Brother Gearhart, that it is a matter of education, but so far as spreading the manure is concerned, I have never seen the day when, if I could get up to go to the stable, I could not go to the field too.

The SECRETARY: Put it on with a spreader.

A Member: Would you think it profitable to put it on with the rain?

The CHAIRMAN: I have always done that, and never lost a day because it rained.

A Member: If you went up the Cumberland Valley on a wet day, and then had to let it lie, when it became dry you would see where you found it.

The CHAIRMAN: Perhaps I am talking too much, but I am simply giving you my own experience.

A Member: I agree with the member on what he says about letting the manure lie out in the rain. It is not that a man would care so much for the rain.

As a boy, I was taught that the fly was a scavenger, and carried off the refuse, but I have been taught better. I think that if we can get this matter into our schools, a great deal of good will be done. But a few years ago we couldn't get the teachers, or even the County Superintendent to take any interest in anything pertaining to agriculture. I see they are beginning to teach it now and it is something to be thankful for.

MR. BARNES: I don't know whether any of you have ever tried to get rid of the fly in the way we do on my place. As soon as the manure is removed we burn flour of sulphur in the stable and spread lime on the floor, and we are never bothered with flies. We always try to get our manure out, rain or shine.

The SECRETARY: You will have to take care who handles the burning of the flour of sulphur.

MR. BARNES: We do in an iron kettle and take good care not to set anything afire.

The CHAIRMAN: This discussion is very interesting, but we will now have to take up the next subject which is, "Computing Dairy Rations," by Prof. H. E. Van Norman.

Professor H. E. Van Norman spoke as follows:



## COMPUTING DAIRY RATIONS

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By PROF. H. E. VAN NORMAN, *State College, Pa.*

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In taking up the computing of rations, I shall outline my suggestions in new terms—that is new to many of you who have for so many years been discussing the feed problem in terms of protein, carbohydrates and fats.

You know Dr. Armsby has been conducting his experiments on the carbometer by means of which he measures the power of the food content. For instance, if we have one hundred pounds of coal in our fire machinery, it will turn into steam and this steam is the energy that is required to do work. Our new term is simply measuring the power of the food content by the power to do work. We measure it by the amount of heat it would produce if burned up, but all of the feed is not available for milk production; a part of it is lost. There is a loss of energy in the faeces, in the urine, in the gases, in the labor of chewing, swallowing and digesting the food, what is left is available for milk production and for energy stored for a gain in weight. Therefore I am going to outline to you a method of figuring it in terms of net energy, with the losses all taken out. In the old method only one loss was taken out.

For instance, one hundred pounds of corn meal is given 41 per cent. net; that is 58 per cent. is lost, or required for digestion. When we get to timothy hay, 51 per cent. is required, leaving only 49 per cent. for production, wheat straw, only one-fifth of all the energy available for milk production. That means that corn meal has only four times as much energy as wheat straw. These figures explain why it is that our new standard is a more accurate measure of net energy, than is our old standard.

Now when we come to figure out a ration for the animals, we know from practical experience and experiments that have been performed, that every animal requires a certain amount of energy for her maintenance; that is a dry cow, that is not in calf requires a sufficient amount of food to keep up her strength. That is what we speak of as maintenance, therefore, we must give that cow enough feed to take care of herself. The amount of feed she requires more than that is for the milk she produces. A lot of us have lost money in times gone by, because we didn't feed a cow more than she needed for her own use. To put it in practical terms, suppose she needs six therms (or we can call them units if you wish) of net energy to keep herself, if she is going to produce twenty pounds of milk, she will require another six therms, which is twelve; and if you only feed her nine of them, you cannot expect her to produce twenty pounds of milk. In fact, she won't do so. Why? Because you haven't given her strength enough to take care of herself and of her milk.

You can take that milk to the laboratory and find just how much energy there is in that milk. Let me emphasize that statement in this way. The amount of milk a cow gives is measured by her ability to eat food above that required for her maintenance. When you go through the country and see a cow running thin, you may be sure she was not fed enough to keep up her energy and produce milk. The dairy cow is primarily a mother, and she makes milk to feed her young. As soon as you see her getting fat, you have proof conclusive that she is getting more feed than she needs to produce milk. There are thousands of farmers in this State who are losing money because they do not feed enough to produce milk. There are a few farmers who go to the other extreme. But that is not the only thing we can get energy from; coal produces energy but the cow cannot use coal so we must feed her something that she can eat and digest—something that she likes. So we feed her carbo-hydrates and fats to produce milk. One hundred pounds of milk contains a little less than sixty-four pounds of casein, and casein contains nitrogen which comes only from carbo-hydrates; therefore we must supply protein in sufficient quantities to produce the milk. If a mason begins a foundation without enough brick of any kind, he cannot complete it, because he cannot make mud take the place of brick; but if he needs only one or two bricks, he can make mud take the place of them. You cannot get a good milk production with an insufficient supply of protein. It is true that when a cow is just fresh, in the first month or month and a half of her period of lactation, if you feed her an insufficient supply of the milk producing feeds, nature has constituted her that she will take the fat from her own body and make milk. That is why a cow gets thin after freshening. Dairymen have profited by that. The Missouri Experiment Station have made an experiment on that. They allowed a cow to draw her fat when she was producing twenty-five to thirty pounds of milk. At the end of thirty days she was giving the same amount of milk, but she was only fed the amount required for her maintenance. What was the result? She had drawn on her body to make this milk, and she was so weak that she could hardly stand up, and had to be helped on her feet. That shows how strong is Nature's determination to furnish food for that calf.

Now, after that calf gets to be from six, or eight weeks old, it is presumed to be able to care for itself, and the amount of milk supply decreases unless the cow is given from a half to a pound of protein to take care of herself. She requires six therms of energy to take care of herself. If she is supposed to produce milk she requires six therms more. A thousand pound cow, giving twenty pounds of four per cent. milk, needs twelve therms of energy and one pound of protein. I will not go into details with the figures because we are about to issue a bulletin at the College, which you can get by addressing us, and which will give you all the figures.

It is not possible for me to figure out exactly the ration required for your cow. In the next place, it is not possible for you to guarantee to me that your silo is exactly the same composition as the silage of the bulletin? Now, there is no use quarreling over these small details. There is no use spending a dollars worth of time to get fifty cents worth of exactness on paper. Now, what is required

of you is to get a reasonable ration that will give her the required amount of energy and then feed her in proportion to the amount of milk you expect her to produce.

The next rule: Feed your cow a grain mixture for the purpose of making flesh, and then give her all the roughage she will eat. A good proportion is one pound of grain to each three pounds of milk, or if the grain is high priced and she thrives on roughage make it one pound of grain to each four pounds of milk; anywhere along there is safe; and you can get the most ignorant farm hand to follow this rule and be sure of good results. Our roughages are usually short of protein, so we must mix it with grain and in order to produce twenty pounds of milk a day, we must give the cow from one pound to one pound and a half of protein; so we must make the mixture to cover the difference. If you feed timothy hay, corn stover and silage, you must have a good deal more protein in your mixture than if you are going to feed from clover or alfalfa. The amount of grain will also tell a little the amount of protein there must be in your grain mixture. The more grain you feed the less protein, in proportion to your energy will be required.

Now I divide our roughages up into three grades. The first grade is timothy hay, corn stover and silage; with this you have one pound of protein for every four therms of energy. But if you have for your mixture clover hay and timothy, or clover hay and silage, then the protein is one in five. Of clover hay and alfalfa, you get as high as one in seven or eight; in fact I think you can go so high as to feed simply straight corn meal. In following any of these rules, I have tried to give you simply enough protein to safely expect the cow to do her work. In fact, I think you are giving her more than she needs. It may be a quarter of a pound of protein more than she needs, but it is not as expensive as two or three of the robber cows that most of us have been keeping.

Now when we come to making up a grain mixture, I believe it is advisable to make the mixture of at least three or four different kinds of feeds. We want to stimulate the appetite of the cow, and experiments of the New York Experiment Station show that the animal does best on a variety of feeds. The four things then we want to remember in studying what would be a reasonable ration for the cow are:

- (1). Cost of the feed.
- (2). Effect on the system of the cow.
- (3). Practibility.
- (4). Bulk.
- (5). Variety.

The relative economy of two feeds is not measured by their cost price, but is measured by the cost at which they furnish the needed energy. The cottonseed meal is to-day almost the highest priced feed per ton on the general market, and yet it is one of the cheapest feeds we buy, because it furnishes a larger amount of the needed energy per dollar than any other feed we buy. Now a lot of you have a mistaken notion that you can pay a low price for some of the cheap hull feeds, but if you divide the cost of one hundred pounds by the therms of energy it furnishes, and the cost of the one hundred



pounds of protein by the amount of energy it produces, you will find that the cheap hull feeds are not so cheap after all. I would ask you to use the best feeds you can get; it will pay you. The cheapest feeds are the ones that produce energy the cheapest. That at this present time will be corn meal or corn and cob meal. The feed that will furnish protein the cheapest will be cottonseed meal. Next, it will be gluten, or Ajax or brewery grain. Wheat middlings is one of the cheapest feeds we can buy at the present time in our Middle states. All are good, so we will take the one that has the best effect on the system of the animal. Some animals are individually constipated and some are individually lax. We want to counteract the one by the other. If we don't have any silage or roots, or beet sugar meal feed, we put a little oil meal into the mixture about once a day. If we have any of the other feeds, we do not use the oil meal, because it is expensive. Most animals can be taught to eat anything that is desirable. Boys can't, because they were spoiled in their bringing up. Start small; put in a teaspoonful if necessary, and then bring up the amount. But it is usually desirable to feed them what they want, if it doesn't cost too much.

Next, comes bulk. The cow's machinery is usually built to hold a large amount of feed. But we can overdo it; a cow cannot eat all clover hay and do her best work, therefore we want that bulk composed of something that will increase her energy. I would mix with the hay, some corn and cob meal or distillers' grain, or gluten. If you have to use only heavy feeds, I would chop some of the hay.

Next, comes variety; I don't know how important this is, but most of our men who do experimenting believe that cows work better when they get a good variety of feed; and from the results of these experiments, I believe that this is true.

Now, the next point that I would make is, that in making up a grain mixture we get down to an actual method of work. If that cow is to be of much profit, you want to get that energy as cheap as possible. We take one hundred pounds of protein, as a basis, and to this we add the amount of cottonseed meal you think should be used; then the amount of gluten feed; then add this up and divide the possible protein into the possible energy. If it comes out right you get a mixture from that standpoint. If not, you can add to it until the sum total of the protein divided into the sum total of the energy gives the right total, and you can work according to this rule, no matter whether you mix twenty-five pounds, or fifty pounds, or one hundred pounds, or two hundred pounds, or three hundred pounds you will find it simplifies wonderfully the mixing of the rations.

Another thing that our bulletin will contain is totals in which we have dropped the decimals. Now, if you will take the trouble to compare you will see that cottonseed meal has 84.23 therms of energy, and 10.27-28 of protein. Now I have figured that in making mixtures of this kind, it will simplify matters to drop the decimal, and use only the whole numbers, the small amount contained in the decimal will not matter. Again I am recommending that we use one hundred pounds value instead of fifty or twenty-five pound values; however, you will find a table in which I have given the protein and energy in connection with twenty-five, one hundred, two hundred,

and three hundred pounds you can make up almost any kind of a total and figure the amount of protein. Now to give you a sample list, which I have figured up here:

RATIO OF PROTEIN TO NET ENERGY FOR DIFFERENT ROUGHAGES,  
QUALITIES AND QUANTITIES OF MILK

When roughage is	When feeding one pound of grain for each four pounds of milk per day	When feeding one pound of grain for each three pounds of milk per day
<p><b>GROUP I</b></p> <p>Consisting of Timothy Hay or Corn Silage or Corn Stover or any two or three of them, make a mixture.</p>	<p>For cows producing less than 15 lbs. of milk per day, make a mixture containing 1:3.5 of net energy.</p> <p>If producing over 15 lbs. milk per day, make a mixture containing 1:4 of net energy.</p>	<p>For cows producing less than 20 lbs. of milk per day, make a mixture containing 1:4.5 of net energy.</p> <p>If producing over 20 lbs. milk per day, make a mixture containing 1:5 of net energy.</p>
<p><b>GROUP II</b></p> <p>When in addition to silage or fodder, 5 to 7 lbs. of clover or alfalfa are fed, or when mixed hay is half clover.</p>	<p>For cows producing milk testing 3 to 3.5% fat, Protein 1 to 5 net energy.</p> <p>For cows producing milk testing 3.5 to 4.5% fat, Protein 1 to 5.5 net energy.</p> <p>For cows producing milk testing over 4.5% fat, Protein 1 to 6 net energy.</p>	<p>For cows producing milk testing 3 to 3.5% fat, Protein 1 to 5 net energy.</p> <p>For cows producing milk testing 3.5 to 4.5% fat, Protein 1 to 6 net energy.</p> <p>For cows producing milk testing over 4.5% fat, Protein 1 to 6 net energy.</p>
<p><b>GROUP III</b></p> <p>When all the roughage is clover or alfalfa hay.</p>	<p>For cows producing milk testing 3 to 3.5% fat, Protein 1 to 6 net energy.</p> <p>For cows producing milk testing 3.5 to 4.5% fat, Protein 1 to 6.5 net energy.</p> <p>For cows producing milk testing over 4.5% fat, Protein 1 to 8 net energy.</p>	<p>For cows producing milk testing 3 to 3.5% fat, Protein 1 to 6 net energy.</p> <p>For cows producing milk testing 3.5 to 4.5% fat, Protein 1 to 7 net energy.</p> <p>For cows producing milk testing over 4.5% fat, Protein 1 to 8 net energy.</p>

THE RELATIVE NET ENERGY IN CORN MEAL, TIMOTHY HAY AND  
WHEAT STRAW

Total Energy	Lost in feces	Lost in gas	Lost in urine	Lost in labor	Total loss	Net energy
%						
100 Corn meal, -----	9.2	9.3	3.9	36.3	58.7	41.3
100 Timothy hay, -----	48.9	3.8	3.1	29.5	85.3	14.7
100 Wheat straw, -----	54.8	9.0	2.5	27.7	94.0	6.0

TABLE III—MAINTENANCE RATIOMS FOR COWS

	Pounds digestible prot.	Therms net energy
750 lb. cow requires for maintenance about, -----	.4	4.95
1000 lb. cow requires for maintenance about, -----	.5	6.00
1250 lb. cow requires for maintenance about, -----	.6	7.00
1500 lb. cow requires for maintenance about, -----	.65	7.90

TABLE IV—REQUIREMENT FOR MILK PRODUCTION IN ADDITION TO MAINTENANCE

	3% Milk		4% Milk		5% Milk	
	Protein	Energy	Protein	Energy	Protein	Energy
For 1 lb. milk, -----	.045	.22	.05	.30	.055	.39
For 10 lb. milk, -----	.450	2.20	.50	3.0	.55	3.9
For 15 lb. milk, -----	.675	3.30	.75	4.5	.825	5.58
For 20 lb. milk, -----	.900	4.40	1.00	6.0	1.10	7.8
For 25 lb. milk, -----	1.125	5.50	1.25	7.5	1.375	9.7
For 30 lb. milk, -----	1.35	6.60	1.50	9.0	1.65	11.7

Ration 196		Protein	Therms energy
175 lb. Corn and cob meal, -----		7.	126.
100 lb. Cottonseed meal, -----		35.	84.
100 lb. Distillers' grains, -----		22.	79.
100 lb. Linseed meal, -----		29.	75.
475 lb. Contains, -----		93.	364.
1 lb. Contains, -----		.195	.766
Ration 107			
200 lb. Corn and cob meal, -----		9.	144.
150 lb. Cottonseed meal, -----		52.5	126.
175 lb. Distillers' grains, -----		33.5	129.
100 lb. Gluten feed, -----		20.	79.
625 lb. Contains, -----		120.0	488.
1 lb. Contains, -----		.192	.780



	Protein and Net Energy in					Price per ton	Price 100 lb.	Cost 100 lb. protein	Cost 100 T. energy
	25 lb.	50 lb.	100 lb.	200 lb.	300 lb.				
Ajax Flakes, ----- (P)	5.5	11.	22.	44.	66.				
Barley, ----- (E)	20.	40.	79.	158.	237.				
Brewers' Grains, dry, ----- (P)	2.	4.	8.	17.	25.				
Brewers' Grains, wet, ----- (E)	20.	40.	81.	161.	242.				
Brewers' Grains, dry, ----- (P)	6.	9.5	19.	38.	57.				
Brewers' Grains, wet, ----- (E)	20.	30.	60.	120.	180.				
Beet Pulp, ----- (P)	.9	1.9	4.	8.	11.				
Beet Pulp, ----- (E)	3.7	7.5	15.	30.	44.				
Buckwheat Mid., ----- (P)	1.7	3.5	7.	14.	20.				
Buckwheat Mid., ----- (E)	15.	30.	60.	120.	180.				
Buckwheat Mid., ----- (P)	5.5	11.	22.	45.	67.				
Buckwheat Mid., ----- (E)	19.	38.	76.	152.	228.				
Corn, ----- (P)	1.7	3.5	7.	14.	20.				
Corn, ----- (E)	22.	44.	89.	177.	265.				
Corn and Cob Meal, ----- (P)	1.	2.	4.	9.	13.				
Corn and Cob Meal, ----- (E)	18.	36.	72.	144.	216.				
Corn Hearts, ----- (P)	3.5	7.	14.	28.	43.				
Corn Hearts, ----- (E)	21.	42.	84.	168.	252.				
Cottonseed Meal, ----- (P)	9.	17.5	35.	70.	105.				
Cottonseed Meal, ----- (E)	21.	42.	84.	168.	253.				
Distillers' Grains, Corn, ----- (P)	5.4	11.	22.	44.	66.				
Distillers' Grains, Corn, ----- (E)	20.	40.	79.	158.	237.				
Distillers' Grains, Rye, ----- (P)	2.5	5.	10.	21.	31.				
Distillers' Grains, Rye, ----- (E)	15.	30.	61.	122.	183.				
Gluten Feed, ----- (P)	5.	10.	20.	40.	60.				
Gluten Feed, ----- (E)	19.	39.	79.	142.	237.				



A Member: With one hundred pounds of union grains, how much cottonseed meal would it take to make up the required number of therms—in union grain there is about 27 per cent. of protein.

PROF. VAN NORMAN: I think it would be one hundred to three or four hundred. The following is a mixture which would go well with timothy hay and corn stover:

400 pounds of corn meal.  
100 pounds of cottonseed meal.  
300 pounds of distillers' grain.  
100 pounds of gluten feed.

Now that amount of grain would contain 7.44 therms of energy. If you want to find out whether it is a cheap ration or not, figure out what it would cost you at your price, and divide by 7.44 to get the cost of the energy, because that amount of grain contains 7.44 therms of net energy. At the present market price of grain, you should be able to furnish the necessary amount of protein at less than two dollars, our's costs one dollar and seventy-nine cents, buying in carload lots, as we have been able to do. Now that is protein, 1 to 5 per cent. net energy.

Now I will give you over two other mixtures, which you may like to figure out. Here is a mixture which I believe can be fed profitably at the present prices, but there are many of our farmers who have to figure on their own home grown products; they want to figure linseed meal, because it is low in price, and corn meal and oats, and bran, because they have them.

300 pounds corn meal.  
300 pounds linseed meal.  
200 pounds oats.  
400 pounds bran.

This contains 8.14 therms of energy; divide the cost by 8.14, and it gives you the cost of the feed to you—not the cost of the energy—and I think you will find it runs somewhere near 2.15 per hundred as compared with 1.85 for the other.

In making up your grain mixture, spread on the barn floor, first the bulky feeds; put on top of these the next lightest and so on, with the heaviest on the top, then spread it as a good cement mixer spreads his cement; then take up a shovelfull and lift it clear off the floor and throw it over to the right or left, and then throw on the next shovelful, spreading it as you go, and mixing it, and then throwing it back again into the middle of the floor in the same way; at the end of the third handling it should be properly mixed.

Now it is usually no trouble to weigh the feed; if not every day, I believe it is wise to weigh it once a week at least. If she gives eighteen pounds of milk, she should have three pounds to eat. Mark the amount on the stall, if you don't care to weigh it up each time get a measure that will hold the proper amount. The greatest need of our farming is business methods.

The last five years have been years of science and bacteria, the next ten years are to be years of business and profit. We must get down to figures. If you only sell two hundred dollars worth of



business off your farm, you cannot have two hundred dollars worth of profit. Study your profits, or don't do business.

The next step will be the science of feeding—the study of economy in feeding. Find out what your cows are doing, and don't buy forty dollars worth of feed for a cow that only gives thirty-five dollars worth of milk.

The CHAIRMAN: What is the pleasure of the meeting concerning this most splendid report?

MR. HUTCHISON: I move it be received and published with the proceedings.

This motion was properly seconded and duly carried in the regular way.

The SECRETARY: Now, Mr. Chairman, if there is any discussion on this subject or any questions to ask Prof. Van Norman, now is the time, and I would suggest that we devote a little time to the discussion.

MR. GEARHART: I would like to ask a question in regard to the value of the protein in corn. During the fall of this year, I was feeding my cattle a good second crop of clover hay with about seventy-five pounds of corn and cob meal and about one hundred and thirty-five pounds of dried brewers' grains—mostly barley—prior to that I had been feeding about the same ration of cob, corn, gluten and clover hay. I used the new mixture pound for pound, but the cows appeared to fall off in milk so I substituted wheat bran for the dried brewers' grain and they soon picked up again. Now the analysis of this dried brewers' grain gives 26 per cent. of protein, while wheat bran is only given as about 16 per cent. Now can you explain why this was so?

PROF. VAN NORMAN: Well, there are other factors than those I have spoken of that enter into this feeding problem. It seems that some feeds stimulate digestion. Then, again the figures as you get them from the mill are the total protein, and you have no deduction for digestion, while here you have the four losses and some of the figures are very different when you get them with all the losses deducted. Without actually seeing your feed I don't know that I can answer your question more exactly.

MR. GEARHART: But you do think that the analysis as given is not always correct?

PROF. VAN NORMAN: Yes; or it may be that your totals are not always correct. They may be higher or lower.

MR. J. ALDUS HERR: In Lancaster, we are corn growers and to a great extent, we know that unless we feed a considerable proportion of corn during the growing period of the corn, we will not get the best results. If we feed more of the by-products, such as brewers' grain, with our silage, nearly always the cows lose in flesh. We can't very well get away from the corn in spite of the fact that we are apt to go to the other extreme and feed too much corn.

PROF. VAN NORMAN: Now when you go to feeding corn, the first result possible in feeding high protein feed is that you feed more protein than necessary, and the best condition of our cows is not produced by feeding an excess of protein.

A Member: What will be the number of your bulletin?

PROF. VAN NORMAN: I can't tell you yet. I have just handed the manuscript to the printer, and you will simply write for the bulletin on feeding, and it will be sent you.

MR. GEARHART: One more question. I have found gluten feed to be one of the best milk producers, but there is an acid about it that I would like to know whether it is injurious to the cattle?

PROF. VAN NORMAN: The Geneva Experiment Station has done work on the acidity of gluten feeds, and while there is an excess of acid generally, I think the probability is that the danger is very small, and the thousands and thousands of tons used without injurious results, would seem to bear out the statement I make that it is not injurious; and then again, it is only one out of four mixtures.

MR. GEARHART: My experience has been that the more variety the better.

PROF. VAN NORMAN: Some of our best feeders have gone as high as six or seven.

MR. J. ALDUS HERR: In line with the general question, some of us in Lancaster county found the results from some of these gluten grains were not satisfactory, and we sent them in for analysis. We found some acid, but we were not able to tell whether it was the result of this or not, so we tried an experiment.

We arranged with the State Livestock Sanitary Board to feed this feed exclusively to some of the cattle in their Veterinary Department at Philadelphia, and they reported to us that it would do no harm.

MR. HUTCHISON: In this case the Veterinarian said that it is just possible that these cows died of this acid. Five of these cows died in that county, and yet the cows to which it was fed as an experiment all thrived on it. There is acid in small amounts in all feeds, but an investigation made in the laboratory by our chemist, who was here this morning and who has made a number of tests, shows that they do no harm.

We had with us here yesterday a man who was interested in beet pulp, and he claims that it puts the stomach in shape for the other feeds to work on. It was a new statement to me, but it sounds plausible after what has come out in this discussion.

PROF. VAN NORMAN: This beet pulp has some value in these analyses; it seems to stimulate, I look at it in this way: The cow eats to satisfy her appetite in proportion to the feed she eats. If you go out and work very hard, you eat a great big meal as the result of your exertion, but if you have done nothing for four or five days, you cannot eat a big meal, if you know you are going to have

a big lot of work, you eat in order to store up all the energy for doing the work. Now the statement is made that the cows eat to supply her internal demand for food, and it seems as though beet pulp helps to stimulate this demand.

Now you should know that you can eat crackers, but it will be hard to keep you going. If you don't believe it, you get three good sized crackers and try to eat them dry in a minute and a half. If you put on a little butter, or eat an apple with them, it will be all right. But it is not only a question of feed; it is something more. Now, the rules I have outlined, each man can follow as his judgment dictates.

The CHAIRMAN: What effect has molasses on the cow?

PROF. VAN NORMAN: It seems to be an appetizer and a laxative. The cow can sometimes be made to eat hay which she would not otherwise eat, but I do not think it has any food value and it is largely being dropped on that account.

The SECRETARY: I am afraid, Mr. Chairman, we will have to move on to the next subject. These discussions are very interesting—particularly the last remarks about the beet pulp, which is something new to most of us.

The CHAIRMAN: We will now take up the next number on the program, "Ear-Marks of the Farm," by S. C. George.

Mr. George's paper is as follows:

## EAR-MARKS OF THE FARM

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By S. C. GEORGE, *West Lebanon, Pa.*

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It is not my intention in this paper to try to instruct such an intelligent audience as this, yet we would consider our time and efforts wasted did not some one gather some thought from it that would be of use to him, for we know that it is he who has knowledge who thirst for more.

In choosing our subject we were guided partly by an article in the "National Stockman and Farmer" from the pen of W. D. Zinn in which he said, "That good farming had certain ear-marks that could not be mistaken." While this is true, poor farming also has its ear-marks, that are equally easily discernible, and as straws indicate which way the wind blows, so there are certain marks that point to good or poor farming.

We should emulate the good farmer; we should strive to learn all we can from him; his methods, his operation, and his achievements. But we can also learn a great deal from the poor farmer by avoiding his failures, noting his carelessness and his mistakes.



## WHAT ARE SOME OF THE EARMARKS OF THE FARM?

When we see the buildings in good repair, the machinery carefully put away when not in use, the fences neatly built, fence-rows trimmed with care, a good sod on the fields, the growing crops thrifty, the manure hauled out on the fields at the right time, the animals sleek and in good condition, we know that the owner or caretaker of that farm is a good farmer, and one whom we can safely pattern after.

But on the other hand when we see dilapidated buildings, buildings not old but out of repair and neglected, where paint has not been used, where doors are off their hinges, gates hanging by one hinge, or perchance lying on the ground, where the boards are loose on the fences, fence-rows grown up with briars, elders and bushes of all kinds that you could not plow within a rod of the fence, fields covered with weeds, golden-rod, aster, wild carrot, daisy, and thistles instead of grass, the machinery standing in the field where it was last used or in a fence-corner, or under an apple tree, the fowls roosting on the trees, the cattle looking as if they had the "hollow horn" or "wolf-in-tail," had lost their cud and not enough in their stomach to make a new one; then we see some of the marks of the poor farmer.

Have you ever noticed in traveling along the highways or in the railway car the differences in farms? Even if there be no fences you can easily discern farm lines by the different appearance in the farms. Or, if there be fences, one man will have his side clean up to the fence, while the other side cannot be reached by several rods. And this only makes work harder for the man who strives to keep his farm clean; where a spinster owns a farm on the west of you and a so-called city farmer owns one to the northwest, where weeds are left to grow unmolested, to ripen and be blown by the wind or carried by birds, it is a difficult problem and it is only by persistent efforts that one can succeed.

And while it is not our purpose in this paper to tell how to do things, yet right here we would say that the use of the mowing machine, the scythe, the brier hook or the mattock at the right time is one means by which we surmount many difficulties and where our work, on the farm, will show to good advantage.

But you do not need to go to the farm to distinguish between the careful and the careless farmer. Meet him on the road with his team, go to the market place, the mill, the coal mine, the railway station, or wherever farmers congregate with their teams, and note the difference, and you will have an ear-mark of what you are likely to find on the farm. One with a broken spring on his wagon seat propped up by a piece of plank, the wagon bed so badly broken that it would hardly hold pumpkins, the harness tied up with binder twine or baling wire, and you may be sure to find similar conditions on the farm, where no modern methods are used; a man who says Farmers' Institutes are a farce and that farm papers are fit only for kindling wood.

But on the other hand you notice different conditions; the harness kept well oiled, broken places and nuts kept tight about the wagon, the harness good, and the horses neatly groomed, and you draw different conclusions. You are sure on that farm to find a man

who takes time solving the problems that arise on the farm, one who uses all the means to advance the productive powers of the farm.

We can also learn a lesson in economy right here, for while it is necessary to be neat and careful, we do not need to be extravagant. And how often do we see a team loaded with rings and regalia simply to try to outdo one's neighbor! It is a pretty guess, that in the house the good wife is struggling for some needed article of necessity.

#### WHAT IS THE TRUE AIM OF FARMING?

Is it to buy more land, to raise more corn, to raise more hogs, etc., etc., ad infinitum? What should be the object of any man's life? If it is not to enjoy the fruit of his labor?

The home is one of the ear-marks of the farm that is too often overlooked. The home should be attractive. In our great cities where land is dear, houses have to be built on small areas and into the air; but this is not necessary in the country. It may have the comforts of a city house without looking like one. The tasteful home has a sale value in the country as well as in the city. It adds value to the farm as well as enriching the soil to make it more productive, yet this is a wealth that cannot be counted in dollars and cents.

The conveniences in the home are marks of distinction. The fuel and the water are of great importance, especially the latter. How often the water has to be carried up steps or from a far-away spring, or pumped out in the cold, when for a few dollars the water could be had in the house.

"It's great to be a farmers' wife,  
And live upon the farm  
And rise up early in the day,  
To make fires bright and warm,  
That the farmer man has kindled  
For his faithful loving one,  
Who now prepares the breakfast  
And thinks it first class fun.

"It's great to be a farmers' wife,  
And breathe the country air,  
To raise the chicks and gather eggs  
And sell for prices fair.  
The children love their mother,  
And the father loves her too;  
And to keep her kingdom moving  
Is all she has to do."

#### CO-OPERATION OF HOME AND FARM

Co-operation in the home and on the farm is one of the essential factors in success and happiness. It is just as necessary here as in a business firm. The wife and children should feel that they are members of the firm, and not merely boarders. It is not always necessary that such services shall be paid in money, but oh! there are so many ways of rewarding where money could never pay the debt.

"Little deeds of kindness,  
Little words of love."

When such conditions exist there are no suits in our divorce courts, and the boys and girls are not in a hurry to leave the farm.

There are farmers who sell everything off the farm that will sell, or the best of everything, keeping for himself only that which is not marketable. Is this wise? Is it good farming? The farmer's table should be supplied with the best of everything; not necessarily expensive, but plenty of fresh, wholesome food. The farm will furnish the fruits, the vegetables, the milk, the butter, the eggs, the meat, with little labor if proper means are used. When these things sell high in the market, the farmers are tempted to sell, but he can afford to do so only when the supply is greater than the demand at home.

One of the ear-marks of the farm that cannot be denied, is the reading-table in the home. Let me go into the home and look at the literature, and I will tell you what kind of a family it is. This is a day of reading. It is not enough for a man to have brawn and muscle, but he must have brain. In this day of agricultural schools, experiment stations, farmers institutes, and with the writing in our farm papers of such men as Agee, Zinn, Chamberlain, Lighty and a score of others, there is no reason for a man not to be educated. Allow me to repeat, then that whatever may be the other conditions of life the home should fill the first place. In fact you never know a man till you see him at home.

Good business is a mark of the farmer. How often in the transaction of our affairs do we use no business ability. The farmer should be a business man, and the farm will soon show the results. He should keep informed as to prices, know when to sell to best advantage, to buy and sell in a business way. Method is another feature that is lacked by many farmers. Doing our work in a careless way and its results are soon seen. But have these ear-marks a value? They surely have. The manufacturer or the dealer has a trade-mark on his wares or his goods which sells them. So should the farmer have; the mark is bound to be there and if he does not put on one of which he is proud, the other kind will put itself there. If your trade-mark is right, when you have anything to sell whether it be an animal, grain, hay, fruit, vegetables, butter or eggs, an "ad" in the paper is enough to bring you buyers in abundance, but if the goods be such that you are ashamed to put a trade-mark on them there is a poor market for your produce. Fellow-farmers what kind of ear-marks are on your farms?

The CHAIRMAN: What shall be done with this excellent paper?

On motion, properly seconded and duly carried in the regular way, the paper was received to be published with the proceedings.

The CHAIRMAN: Is there any discussion? If not we will proceed with the other business.

A paper was handed to me to announce that the report of the Ornithologist at 1.30 this P. M. will be illustrated.

Are there any Committees to report?

MR. J. ALDUS HERR: The Legislative Committee met in Mr. Martin's office, and mapped out a line of work for us to do and make a report at the meeting in Towanda.



The SECRETARY: It will be necessary to call this a Special Legislative Committee, because there is a standing Legislative Committee. It will be so entered on the record.

The CHAIRMAN: Any further business before the house?

The SECRETARY: It may be that some one will want to make a few remarks.

MR. J. ALDUS HERR: Last evening when Dr. Conard made his report on the dairy interest, it struck me that there is one side of the dairy interest, that has been neglected, and that is the education of the consumer as well as the producer. Two years ago there was a meeting called at Lancaster to get better milk for Lancaster city; and as I understand it, after the inspector had been over the county, there was not one sample of milk or cream found that was deficient. Now we have in the neighborhood of one hundred men selling milk, in Lancaster, from six cents up. There is one man receiving milk from two herds, who gets ten cents. For this same milk sold in Lancaster at from six to ten cents, the producer doesn't get over three cents. Now the point I am going to make is, that the retailer doesn't know the difference between milk that sells at six cents and that which sells at ten cents. Would it not be well to educate the public? We see bottles and cans of milk setting on the step until noon, and then the producer is held responsible. I think the public should be educated as well as the producer.

PROF. VAN NORMAN: There is another side to that; Dr. Whitaker, of Washington, in his illustrated report at Pittsburg, showed that a piece of bread and five cents worth of skim-milk furnished more nourishment than some of the higher qualities at ten cents. In this day of high cost of living, that is something worth knowing.

The SECRETARY: And the relative value of cheese and beef steak—can Prof. Van Norman give us the figures?

PROF. VAN NORMAN: I cannot, offhand.

MR. HUTCHISON: You wouldn't want to live on cheese all the time.

The SECRETARY: I want a variety, such as cattle get.

PROF. VAN NORMAN: You know that in Europe the people live on a piece of cheese and rye bread and will do hard work on it—an evidence that it is not only cheap, but nourishing. There is more nourishment in ten cents worth of cheese, than in ten cents worth of meat.

The CHAIRMAN: I don't doubt that. We are all eating too much meat.

MR. HUTCHISON: There are some people you could feed all the meat on earth, and they wouldn't get fat. It is the individual you have to suit.

The SECRETARY: You know in the development of the human race, the further you go in civilization, the more varied the diet is.

MR. J. ALDUS HERR: I am a little interested in the dairy end of it. We want to conform to our pure food laws as near as we can, but will you please tell me why you go to a hotel and can get only skim-milk for your coffee? You don't get milk even if you are paying for it, and when you produce Jersey milk yourself, it is a little hard on you.

PROF. VAN NORMAN: The same reason they are investigating the Steel Trust today, somebody is getting too much profit.

MR. J. ALDUS HERR: I want to cite an instance, in my own home town, where I sometimes take my meals. I know skim-milk produced in Lancaster county that is better than the cream served at that hotel.

The CHAIRMAN: I think probably they do it for your good, because Prof. Van Norman says there is more nourishment in skim-milk than there is in cream.

#### DISCUSSION ON GAME LAWS

MR. WEIMER: There is a question I would like to present to the audience, that has not been touched upon, and that is, the Game Laws. I present it as President of the Lebanon County Game Protection Society, and also as a farmer, that is, that a license law should be gotten up which requires a license tag to be placed on the back of the gunners, the same as on the auto. (Laughter). Now, that is all right to laugh at, but these gunners go over your land, and shoot at you, and everything else they see, and how are you going to arrest them? On my farm I'm trying to preserve some Oregon quail; and I have had this experience on my farm. They shot at the quail and scattered them, and shot at me, too. Under present conditions a man, or even a boy, can buy a gun for two and a half to three dollars, they have no experience in handling the gun and they do a lot of damage. Now, what harm would it do to have them wear a nice little tag with a number on it and have a record kept by the Secretary of the Game Commission, so that the gunner could be identified without any trouble? I don't think the farmer should rest satisfied with a license law that does not protect him as it should.

DR. BECK: I heartily agree with the gentleman who made the remarks. To those of you who do not live near a large city it is not much trouble, but to those of us, whose farms are, like mine is, near a large city, it is almost impossible to protect one's self. I have seen as high as thirty men and boys on my land in one day. They shoot at everything—at the chickens in the barnyard, at the cattle, even at my farmers' wife; and I favor the license.

MR. GEORGE: In talking about shooting at everything, a few years ago I was unloading a lot of corn in my own crib, and I heard a rabbit run and hide under the crib, and looking about, I found half a dozen gunners shooting all around the crib, the shots struck all around me and I don't know how I escaped. I am heartily in sympathy with the gentleman who made the suggestion. I think there should be some means by which these reckless gunners could be identified.

MR. HUTCHISON: I am opposed to the Hunters' License. I don't believe in any American man or boy getting a license for one or two days' hunting. I don't hunt myself, but I should hate to lay anything in the way of the poor laborer who wants to hunt for a day or two, and I hope there will never be a law of this kind passed in this Commonwealth. I have a farm of three hundred acres with good shooting. Some friends of Dr. Beck's from Altoona came there and enjoyed themselves very much. I hope never to see this law go on the records. If a boy comes out and shoots a turkey or a chicken, it will not do any great harm. If it were not for the laboring people, who would consume what we raise? The City of Altoona is the best market in the world, right near where Dr. Beck lives. Why, when a boy goes out in the woods and shoots something, he grows a head taller right away. Let him have his day or two of pleasure. The laboring man is the man who takes what we produce.

MR. J. ALDUS HERR: The trouble is, that when the citizens of the town go out to hunt, they don't take their common sense with them. We have a herd of cattle, and I don't pretend to hunt. Three or four years ago, I had four or five persons come out to hunt, one was an Ex-Postmaster, and one an Alderman, and they shot all over everything and scared the cattle into a stampede. When these city people come out, they seem to leave their common sense at home, and they shoot at every thing they see, and run wild; they go into the orchard and into the truck-patch and even shoot all over the house. Two years ago my tenant's wife was so badly frightened that she had to have a physician. It is not so much a matter of the tag, if they would simply bring their common sense with them, but they don't.

DR. CONARD: I would like to cite a case that occurred in Kennett Square in Chester county, this fall. These were not preventable dangers to people, but, they were things that would not have happened if the boys had been at home, where they should have been. Game was scarce, so they began to shoot at everything in sight, and finally they went down along the river, out of sight of the house, where the cows were grazing and shot at them. One of the cows was hit in the head; she didn't die at once, but she was so badly injured that it caused her death a few days afterward. I examined the skull and found it to be a clear case of shooting, that could have been prevented by a license. They knew pretty nearly who did it, because they knew the character of the boys.

A Member: Right near my place a few years ago, some hunters blew the whole top of my neighbor's head off.

DR. BECK: The circumstances are entirely different. Mr. Hutchison and I usually agree, but in this case we cannot agree. We have a tremendous foreign population, and it is that class of people who are doing this shooting and making this trouble. Now this season a veteran of the Civil War, from Altoona was out hunting, and some boys shot him in the face, and ran off and left him lie there, until some hunters came along and found him and sent him to the hospi-



tal, where I think he is lingering yet. These boys who are not hunters, will shoot at anything they see and then run off. I think farmers are very foolish not to take some measures to protect themselves.

MR. JOEL A. HERR: I live pretty close to the mountain side, and it is a great place for hunters. In cleaning up our land, we pile up the stones, and we have some pretty large stone piles in our neighborhood, and if a rabbit goes under one of them, the hunters will work for hours to tear it down, but will not spend a minute in putting it back again, and I have worked for days, putting them back again. Now, I don't think a man should be required to have a license to shoot on his own land, but I do think something ought to be done to protect the farm from the depredations of these irresponsible hunters, who are often so under the influence of liquor that they don't know what they are doing.

PROF. SURFACE: It is not generally known, but it should be known, that it is illegal to take a rabbit from a stone pile or wood pile, such as Mr. Herr designates. I started out last fall, putting up post piles, and rail piles, but the hunters came along and tore them down and committed depredations of various kinds, until I have come to the conclusion that a man is justified in not permitting any hunting on his premises.

The suggestion of my friend, Ex-Mayor Weimer, of Lebanon, who is also President of the Lebanon County Agricultural and Horticultural Association, of compelling the hunter to wear a license tag, is a good one. Most of us are not concerned about the law against stealing, but there are people who are. It is not the responsible person who goes hunting on our premises against whom we must protect ourselves, but it is against the reckless ones who commit all kinds of depredations. Under present conditions, even if the hunter can produce his license, often there is no officer near to make the arrest, in cases where it should be done, and by the time the farmer takes half an hour or an hour to go and find the constable, the offender will be gone before he gets back, and there is no means of identifying him, once he is out of sight. With a license tag there would be no difficulty in tracing him, and the farmer should be so authorized to make the arrest himself.

MR. FENSTERMAKER: We have had the same experience in Lehigh county. Mr. Hutchison has the poetical sense. As Mr. Herr has said, instead of carrying their common sense with them, they carry "corn juice," and they are not all foreigners, either. They shoot down whole apple trees and other things.

MR. KAHLER: I don't want to take up too much time. I have seen a good many depredations, and I merely want to say that I want to be recorded in favor of a license tag.

The SECRETARY: When the gentleman over here spoke of a tag, a good many laughed; but the thought came to me that there are a good many men here today who way back in the '60's, carried a big tag on their backs, and it didn't hurt them. If we were found away from our regiment, we were told pretty quickly where we belonged and sent back, unless we could give some good reason for being away. There is no disgrace in wearing a tag.

MR. GEARHART: I have attended this meeting for several years, and I am surprised at the change of sentiment that has occurred. I believe that if a vote were taken, three-fourths of us would vote in favor of the license tag. I, too, know from experience what damage these irresponsible hunters can do. My wife was pretty nearly shot by a boy, for a rabbit, while hanging out clothes. Then they tore up my stone pile and I could not find time to build it up again until the next spring. It does no good to order them off your premises; they won't go. I believe that the license should be so made that every careless boy can't secure it; but I believe the farmer and his family should have the privilege of shooting on his own land without a license.

MR. BOND: I'd like to see the man or boy that would not get off my land when I told him to go.

The SECRETARY: You would have him "Bond-ed?"

MR. TAYLOR: I wish to place myself on record. In the Western part of the State, we have a great many coal mines and we cannot make these foreigners understand when we try to talk to them, and when they come out hunting, they are not themselves. I wish to place myself on record in favor of the license tag.

The CHAIRMAN: I think this would be a matter for the Legislative Committee.

The SECRETARY: The Executive Committee is ready to report, and as it will take but a minute, and some of you will not be here this afternoon, I think we had better take the time now for this report.

The Executive Committee reported the following appointments of Standing Committees and Consulting Specialists of the Board: (See page 7).

MR. HUTCHISON: I move this report be accepted.

This motion was properly seconded and duly carried in the regular way.

MR. JOEL A. HERR: I move we adjourn until this afternoon.

This motion was properly seconded and duly carried in the regular way.

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Harrisburg, Pa., Thursday, Jan. 25, 1912, 1.30 P. M.

Mr. Eschbach in the Chair.

The CHAIRMAN: The meeting will please come to order. I cannot help but speak of it at this point. In my opinion this is one of the best and most instructive meetings of the State Board of Agriculture which I have attended in twelve years. Every paper

was complete and to the point, and I think that we can congratulate ourselves that we have such an able and efficient body of men to speak to us.

The first number on the program is the Report of the Ornithologist, by Prof. H. A. Surface. Are you ready, Prof. Surface?

PROF. SURFACE: The lantern was taken away at noon; I suppose they didn't know that my report is to be illustrated; my assistant is now getting the lantern ready, and I shall be pleased to have one of the other speakers exchange with me. I have no doubt that Prof. Klinger, the Apiarist, will be willing to do so.

The CHAIRMAN: We will then take up the Report of Prof. Klinger at this time.

Professor Klinger made the following report:

## REPORT OF THE APIARIST

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By H. C. KLINGER

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The year 1911 will pass into apicultural history as one of poorest for the production of honey. Reports have been received from several parts of the State where a small crop was obtained but the general report was "an entire failure." This State is not exceptional in reports of poor crops for this year, since there seems to be a general failure over all the United States and Canada. The failure in this State at least is due to the severe droughts which prevailed the last three years preventing a growth of honey-bearing plants, among which especially was the white clover. The outlook for next year is more promising. The heavy fall rains has started an abundant growth of flowering vegetation, and thus far it was protected by snow, provided the unusually severe winter has not proved disastrous.

The great problems in keeping bees, which men have been trying to solve for years, are apparently unsolved conclusively and still form the subjects of intense study and research. Conditions of weather and climate, sources of honey, manipulation, and numerous other matters enter into making a success or failure possible.

The wintering of colonies has undergone a change. It was formerly thought that all colonies north of 41° of latitude should be wintered in the cellar; but practice has changed so that colonies as far north as Canada are successfully wintered on their summer stands. A crop of honey frequently depends on successful wintering. A colony should go into winter quarters with plenty of young bees and to insure this brood-rearing should go on late in the season. This may necessitate stimulative feeding in the fall after the main honey flow is over. The amount of winter stores depends on the



method of wintering and the length of the winter? Cellar wintering requires less stores than outdoor wintering since there is a smaller consumption of food necessary to keep up the temperature of the hive, but it requires greater care in keeping up an even temperature of the cellar and is, therefore, more desirable for the experienced and those of leisure.

Every colony should have from 25 to 50 pounds of good honey or sugar syrup to winter on. A poor grade of honey in the combs had better be extracted, and the colony fed on a 2 to 1 sugar syrup (two pounds of granulated sugar mixed with one pound of water). The amount of protection for out-of-doors wintering depends on the severity of the winter. In the South no protection is needed. For our latitude hives should have double walls packed between with some dry material, planer shavings, leaves or chaff. If the hives are single-walled they should have an extra cover of either wood or several thicknesses of heavy paper. An absorbent cushion should be placed over the frames as a means of taking up the moisture coming from the bees. If colonies go into winter with plenty of young bees, plenty of stores, and are fairly protected, they are almost certain to come out strong and in good shape for a crop of surplus honey.

Recently there appears to be a tendency of changing from producing comb honey to that of extracted. The question of producing comb honey or extracted depends largely on locality and market. Comb honey brings better prices on the market than does extracted, but the latter is simpler in production. More extracted can be secured from a hive, since the bees are not required to build any comb as the same comb can be used successive times. Again, when there is only a light flow they are very slow to go into section supers than into full drawn frames. At present there is an exodus from comb honey to extracted, and those who produce quantities of the former and are successful may be wise by continuing, as the indications are that comb honey will command fancy prices in the near future. At this time there is practically no comb honey on the market.

The question of controlling swarming during a honey flow, has perhaps received more attention within late years than any other. Formerly, the criterion of success in bee-keeping was the number of swarms; but now it is recognized more as contrary to success. The ideal condition of a colony for producing honey, toward which all progressive bee-keepers aim, is to have the colony "full to overflowing" but not overflowing with bees. This condition is difficult to maintain. With the stimulation to brood-rearing in the spring, agitated by a flow of nectar, there is a tendency to swarm. Very few succeed in eliminating swarming entirely, but with proper methods and care it may largely be controlled. A system of hive manipulation has been brought out within the last year known as the Hand system which is supposed to do away with swarming entirely. It is a method of operating a hive or rather a double hive by which a colony can be made very strong, and by the turning of a switch at the entrance, the working force of bees can be turned into any part of the hive desired, and in this way there is no loss of energy or force in carrying surplus, and the causes which produce swarming are

arrested. The practical utility of this method remains yet to be worked out fully, although those who have tried the system claim it to be a success.

The greatest progress that Apiculture has made in this State during the last year, and perhaps that has ever been made, is the passage of a Foul Brood law by the last session of the Legislature. The bill was drawn up by the State Bee-Keepers Association, endorsed by this body and the Horticultural Association before it was presented. Through the efforts of these various bodies and the earnest efforts of bee-keepers and their friends, the bill passed almost without any opposition, while similar bills in former sessions were ridiculed and hopelessly defeated. The bill provides for State Inspection of all apiaries in the State under the direction of the Secretary of Agriculture. Where the disease is found, directions are given for treatment of colonies infected. Where bees are kept in old-fashioned box-hives the owner may be required to transfer them into movable frame hives. It also provides for the destruction of hives and colonies where necessary and prohibits the sale of infected combs, bees or hive material. The unfortunate part of it all is, that the appropriation for carrying out its provisions was lopped off by the Legislature, thus preventing its being carried out effectively for the present.

During the year other states have been active in securing legislation. Similiar laws were passed in Kansas, New Jersey, Vermont, Tennessee, Minnesota and Illinois, and in British Columbia, for Canada, while progress has been made in other states that have not yet passed any laws of inspection. There are now 33 states that have laws in some form for the inspection of apiaries.

While argument is sometimes brought that the territory would be too large to be covered by inspectors and a law would be ineffective, the fact is true that in states where laws have been in operation for a number of years the disease has been practically brought under control. Pennsylvania bee-keepers, who have suffered so much from the disease, are so eager to make a fight against it that during the convention of the State Bee-Keepers' Association, held at Lancaster recently, a number of members qualified themselves by taking an examination, conducted by Dr. Surface the State Entomologist, and volunteered to inspect apiaries. As there are no provisions made for their payment of services, they expect to do it gratis.

The Bureau of Entomology of the Department of Agriculture at Washington is planning to do greater work for apicultural interests. Dr. Phillips and his corps of assistants are doing splendid work in combating diseases. A number of bulletins on bees have been published for distribution and may be had by writing for them to the Department of Agriculture. One of these is Bulletin No. 397, "Bees," an instructive work on keeping bees; another is Bulletin No. 442, "The Treatment of Bee Diseases." This should be in the hands of every bee-keeper. It describes the indications and symptoms of the various diseases, how they are spread and how to treat them. The treatise is by Dr. Phillips and is the most up-to-date and reliable of any thing that was ever published.

As a further means of distributing information, Secretary Wilson, after a consultation with a committee of bee-keepers, has consented to authorize the publication of several additional bulletins: one on

the relation of bees to horticulture and another on the value of honey as food, besides ordering the preparation of press notices to every paper in the United States.

A number of years ago Pennsylvania was not known among the fruit states, and only within recent years was it discovered that choice fruit, equal to that of any progressive district of the United States, can be produced here. We have only recently awakened to the possibilities of our State. When we consider that only a few colonies of bees covering in flight a radius of a few miles can store a ton of honey, and when we see acres upon acres of land not winged by bees, we realize that there must be millions of nectar-secreting flowers that remain unvisited by them, and there must be tons of honey wasted upon the desert air.

If the soil is uncultivated, there still remains in it a latent power that some wanderer may find centuries later; if the mineral in the earth remains unearthed, it loses none of its virtue or value. But here is a product, formed daily, that may satisfy the desire of a peasant or grace the menu of a king, that "if the harvest is ready and the laborers are few" or none, it is lost forever.

On motion, properly seconded and duly carried in the regular way, this report was received, and ordered to be filed in the regular way.

The CHAIRMAN: The next number on the program is the Report of the Meteorologist, by Mr. E. R. Demain.

The Secretary: Mr. Demain is not here, but his paper, if it is sent in, will appear in its proper place in the proceedings.

The CHAIRMAN: Next in order is the Report of the Mineralogist, by Mr. Baird Halberstadt, of Pottsville.

MR. HUTCHISON: Mr. Halberstadt is in the city; but is not in the room at present. His report can be taken up later.

The CHAIRMAN: We will then take up the report of the Agricultural Geologist, who is here this afternoon and prepared to address us.

COL. WOODWARD: I would like to get the Resolutions Committee together. We will go up to the Secretary's office and go over the two or three resolution we have on hand.

The SECRETARY: Mr. Chairman, there is a gentleman here who has a resolution all written out which he would like to read.

The CHAIRMAN: Mr. Naginey will please read his resolution.

Mr. Naginey read the following resolution:

WHEREAS, A destructive fungous disease known as the "chestnut tree blight" has appeared in many counties of Pennsylvania, causing a serious loss to timber owners and taxpayers; and

WHEREAS, The blight threatens the entire destruction of this valuable native species of tree in Pennsylvania and adjoining states, if not checked and eradicated.



*Therefore, be it resolved,* That the Pennsylvania State Board of Agriculture hereby pledges its earnest and active co-operation with the Pennsylvania Chestnut Tree Blight Commission in the efforts of that Commission to control and eradicate this new enemy of our forests, recommending that each member of this Board assist so far as practicable in promoting public interest in the subject, that the work of the Commission may be advanced as rapidly as possible throughout the affected areas of the Commonwealth.

*Be it further resolved,* That the bill introduced into Congress, appropriating \$80,000 for the use of the U. S. Department of Agriculture in similar work in the various states where the chestnut tree bark disease has appeared, is recognized as a worthy and deserving measure, and the Pennsylvania delegation in Congress is respectfully urged to give it their united support.

The CHAIRMAN: This resolution will be referred to the Committee on Resolutions.

MR. SHOENER: Before this Committee retires, has there been a resolution offered in reference to the Gunner's License Law? If not, I would move that a suitable resolution of this kind be prepared by the Committee.

MR. FENSTERMAKER: I have one that may not entirely cover the ground, but it can be revised and amended by the Committee if they see fit. It is as follows:

“RESOLVED, That we are opposed to any system of Gun License Law which would require the taking out of a State License by the owner of any real estate to hunt on his own premises.”

MR. SHOENER: Mr. Chairman, that would not cover it; my notion was that a suitable resolution be drawn up by the Committee.

The SECRETARY: I second it.

Being properly moved and seconded, this motion was carried in the regular way.

The CHAIRMAN: Now the point that you wish to make is, that this resolution be amended by the Committee.

The SECRETARY: I think the mover's idea was that the Committee on Resolutions should prepare a resolution to take the plan of the one just offered.

MR. JOEL A. HERR: The Memorial Committee is ready to report.

MR. GEARHART: The Legislative Committee is ready to report, and a number of us would like to make the 2.50 train.

The CHAIRMAN: We will then take up the report of this Committee at this time.

Mr. Gearhart then read the report of the Legislative Committee, which is as follows:

## REPORT OF THE COMMITTEE ON LEGISLATION

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The Committee on Legislation beg leave to make the following Report:

This being a year when the Legislature is not in session, the Committee on Legislation have somewhat abbreviated their Report, reviewing the demands for the past rather than claiming new laws to be passed, from any new claims made by the present State Board of Agriculture.

The farmers of Pennsylvania have long been united in sentiment, however, short in action upon the proposition, that the roads to which the State owes its greatest obligation are those thousands of miles of township roads which the farmer must traverse in carrying his crops to market. We look upon this proposition as important, economically, to the city man as well as the farmer. We, therefore, review our stand for a law which will pay to townships, by the State, fifty per centum of all road taxes collected in said townships not, however, to exceed \$20 a mile. Such a law has twice passed our Legislature only to be made inoperative by executive disapproval. We regret that our last Legislature failed to appropriate sufficient money to meet the obligation assumed by the State, when it passed the Jones' Road Bill in 1909. We urge all farmers to insist that they use their votes and influence with the view of securing sufficient appropriations by our next Legislature to meet the deficiencies created in every township in Pennsylvania.

We approve the plan of the State to build 8,000 miles of inter-county highways, as provided for, by what is known as the Sproul Road Bill passed by the last Legislature. This work will not only provide good roads, but will tend to reduce local taxation, as these roads will be maintained solely by the State. Bonding the State, however, for fifty million, we are not so free to say is good business management.

### CHESTNUT TREE BLIGHT

We favor all active efforts towards the suppression of what is known as "The Chestnut Tree Blight," which is attacking the chestnut timber in various parts of the State.

We endorse and hope for the passage of the Bill now before Congress appropriating \$80,000 for the aid of this very important work.

### EQUALIZATION OF TAXATION

We most strongly assert that the taxes as levied and collected in Pennsylvania place an unequal and unjust burden upon the farmers and home-owners, inasmuch as corporate and personal property pays but 3 mills on the dollar while real estate pays 16 to 18 mills. As a means for equalizing taxation we urge increased appropriations for roads and schools, both of which are State, and not local matters of

interest and import. We have outlined above our position upon road appropriations. As to schools, we reiterate our demand that the State pay to school districts a sum equal to the minimum salary of all teachers employed in each district for the minimum school term. As a means for increased revenue, we suggest that a tax of 1 mill might be placed upon oil and coal and such revenue go towards the construction of good roads.

#### OLEOMARGARINE

One of the items of great importance to the farmers, is legislation affecting our great dairy interests; and there is *no greater* menace to this interest than the colored product known as oleomargarine used as an imitation for butter. We have an excellent law in Pennsylvania upon this subject, which only awaits vigorous and conscientious enforcement to make it a sure and safe protector for the farmer. Efforts were made by the oleomargarine people before the last Legislature to hobble this law, but were blocked by the intelligent presentation of the facts by the organized farmers, led activity by the State Grange. It is our duty to be ever alert upon this subject. At the present time a strong effort is being made, on the part of the packing interests who control the market in oleomargarine, which is largely made-up of by-products from the slaughter houses, to secure Federal legislation which will place oleomargarine on a level with good butter. The danger to the farmer is apparent, and the damage to be done by such legislation *cannot be estimated*. We should see that our Congressmen and United States Senators are informed, in no uncertain terms, that the farmers of Pennsylvania are opposed to legislation which will permit the placing of this substitute upon a *level with the real dairy product*. The fraud in oleomargarine is in the *coloring* of it, and this is the *one great point* at issue, and the *only one* the packing trust cares to carry. We strongly insist that it be so dealt with so as to prevent its being colored. Yellow is the *natural* color of butter. The natural color of oleomargarine is *white*.

#### POPULAR GOVERNMENT

We believe that the government of this—and every other state—should be brought more closely to the people. (Government has been taken from the people by years of tolerance until there is a condition when a few political manipulators have the power, through patronage and the control of the public funds, to make and unmake laws to suit themselves). We believe the people should be trusted with absolute sovereignty, and therefore reiterate our demand for these great principles of real democracy. We urge the submission to the people by our Legislature, to pass a constitutional amendment which will unite these proposition into the fundamental laws of our State.

As a part of this same item, we further urge the direct election of our United States Senators.

#### PARCELS POST

The farmers of America have for years demanded of Congress the enactment of a law which will entrust the government with the carrying of parcels as is done by all other governments in the civilized



world. However, we stand by the expression made by an honored member of this Board that we should have "*a real parcels post*; no fake substitute." The Express Companies are parasites upon the legitimate functions of the postoffice department. We see no reason why the farmers should not have the same collect and delivery privileges, enjoyed by the town and city dwellers, nor do we see why anyone should pay the outrageous tribute imposed by the Express Companies, when we have our most efficient and trustworthy mail department of government ready at anytime to assume all of this carrying, from the most thickly-settled urban section to the most remote rural section, and vice versa. We favor the passage of the bill now before Congress, known as the Lewis Bill.

#### PROTECTING AGRICULTURE

We earnestly commend the work of our Department of Agriculture in safeguarding the farmer's welfare throughout Pennsylvania. We regret that the bills asked for by the Department for the rigid inspection of Paris green and linseed oil and for the proper labeling of field seeds, were not passed by the last Legislature. We believe a pure seed law should provide for a penalty for those who sell seeds containing noxious weeds, or being less than 99 per cent. pure. We regret that the Agricultural Extension Bill, providing for an appropriation of \$60,000, failed to become a law; passed the House but failed in the Senate. We urge increased appropriations for Farmers' Institute work, recognizing the great good thus done by the Division of Farmers' Institutes under the supervision of Hon. A. L. Martin.

In conclusion, we again urge our farmers to look upon these matters in a practical, rather than a sentimental, manner. We get nothing by adopting resolutions. We must join words with works and see to it, through our efforts as citizens, that our demands are enacted into law.

#### STATE COLLEGE

We demand increased appropriations for our Pennsylvania State College, of which institution and its magnificent work and excellent management we are justly proud.

#### FRUIT INTERESTS

We recognize that the fruit interests of our State is becoming a great factor, and that Pennsylvania is being noted as a leading State among other states of the Union for its production of delicious fruit. The good work accomplished by the Division of Zoology is apparent to us all.

Your Committee on Legislation reiterates the position long held by this body, that one of the important duties of the farmer is to be alert at all times and in all seasons as regards the laws under which we must carry on our work. We believe in the improvement of farm methods, the advance of agricultural science and education. But we *recognize* the fact, that the farmer must also safeguard his interests through legislation if he would occupy the position in our political life to which his economic importance entitles him.

To this end, we reaffirm our conviction that there are too few farmers in our legislative halls. We most heartily commend the work of the farmers who have been members of our law-making bodies in the past, and insist that more farmers should be elected to represent the people. We, therefore, urge that all members of this Board and all farmers throw aside partisan and selfish considerations, and determine, by their votes, that we shall have more actual, bona-fide husbandmen in our legislative halls.

Respectfully submitted,

PETER GEARHART,  
S. S. BLYHOLDER.  
H. G. MCGOWAN.  
H. C. SNAVELY.  
MATTHEW RODGERS.

The CHAIRMAN: What is the pleasure of the Board?

MR. HUTCHISON: I move that the report of this Committee be received and published with the proceedings.

This motion was properly seconded and duly carried in the regular way.

The CHAIRMAN: We are now ready for Prof. Surface—the Report of the Ornithologist.

Professor Surface made the following report:

## REPORT OF THE ORNITHOLOGIST

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By PROF. H. A. SURFACE

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(This address was illustrated with lantern slides).

As no very remarkable events have occurred in the ornithological field during the past year, the Ornithologist of the State Board of Agriculture, in giving his Annual Report, thinks it best to base his remarks upon our present State law in regard to birds, and to show illustrations of the birds that are unprotected by law, with emphasis that all other kinds of birds than those here specifically mentioned are definitely protected by law in this State at all times, unless they are definitely named as game birds, when they have stated open and closed seasons. Those that are upon the "black list" are as follows:

- ( 1). Blue Jay.
- ( 2). English Sparrow.
- ( 3). European Starling.
- ( 4). Kingfisher.
- ( 5). Shrike.







Fig. 1. Blue-Jay.  
1. Male.            2. Female.

- ( 6). Eagle.
- ( 7). Buzzard.
- ( 8). Osprey.
- ( 9). Sharp-shinned Hawk.
- (10). Cooper's Hawk.
- (11). Goshawk.
- (12). Duckhawk.
- (13). Pigeon Hawk.
- (14). Great-horned Owl.
- (15). Barred Owl.
- (16). Crane.
- (17). Heron.
- (18). Bittern.
- (19). Crow.
- (20). Raven.

Let us discuss each in turn.

#### BLUE JAY

The Blue Jay (see Fig. 1) has a bad reputation for its supposed destruction of the eggs and young of other birds. It is very doubtful if this be true, but it is quite a destroyer of insects, and certainly is not nearly so bad in regard to egg destruction as the English Sparrow, which we so wrongly tolerate. The Jay lives mostly in more or less wooded districts, or in orchards, where it can find concealment during certain parts of the day. It is with us the year round, and is often conspicuous by its noisy calls, and brightly colored blue, white and black plumage. In condemning it for its habits of feeding on the eggs of other birds, we must not forget that it feeds also upon insects of several kinds, while the bulk of its food consists of wild berries, seeds and acorns. We know that where the Blue Jay is abundant, there we also find other birds, and therefore the Jay is not so seriously destructive in character. We do not wish to think of the day when the Blue Jays are exterminated, and we, therefore, regret that it is upon the unprotected list.

In writing on "The Blue Jay and its Food," Doctor Beals, who carefully examined the contents of stomachs of about three hundred Jays, published in his official report in the year book of the Department of Agriculture for the year 1896, the following:

"The most striking point in the study of the food of the Blue Jay is the discrepancy between the testimony of field observers concerning the bird's nest-robbing proclivities and the results of stomach examinations. The accusations of eating eggs and young birds are certainly not sustained, and it is futile to attempt to reconcile the conflicting statements on this point, which must be left until more accurate observation have been made. In destroying insects the Jay undoubtedly does much good. Most of the predaceous beetles which it eats do not feed on other insects to any great extent. On the other hand, it destroys some grasshoppers and caterpillars and many noxious beetles, such as Scarabaeids, click beetles (Elaterids), weevils (Curculionids), Buprestids, Chrysomelids, and Tenebrionids. The Blue Jay gathers its fruit from nature's orchard and vineyard, not from man's; corn is the only vegetable food for which the farmer

suffers any loss, and here the damage is small. In fact, the examinations of nearly three hundred stomachs shows that the Blue Jay certainly does far more good than harm."

In view of the above authoritative statements expressing views which are emphatically endorsed by the writer of this report, is it now time that the intelligent citizens and law-makers of Pennsylvania get busy to bring about legislation to protect instead of destroy the bird, which is at once so useful and so beautiful.

#### ENGLISH SPARROW

The English Sparrow (see Fig. 2) is multiplying with remarkable rapidity, due chiefly to the indifference of mankind. On almost every point, it has proven itself a veritable nuisance. Not only does it feed upon grains of field crops, and upon garden plants of many kinds, but it is objectionable because of its filthy effects in soiling property that might otherwise be clean or presentable. Also, it is certainly the chief aid in carrying the San Jose scale from place to place, and in the poultry yard its presence results in considerable loss through devouring the food intended for poultry.

We believe that the English Sparrow nuisance would be greatly reduced if it were made illegal to let this bird nest upon the premises. It is not difficult to modify its nesting site, so that it will be unable to find a footing upon the cornices of buildings and in other places where its litter is heaped into an uncouth mass and used as a nest. Where it starts to build a nest in an accessible place, it is well to permit it to do so, and wait until after the nest is finished and the eggs are laid and hatched before destroying it. In fact, if the young birds be left in the nest until they are almost ready to leave it naturally, this will lengthen the period until the production of the next brood and result in fewer birds per year than though this nest were destroyed as soon as discovered, or by the time its eggs were laid. To do this, some persons are now placing for the sparrows nesting boxes provided with lids which permit the removal of the young or eggs. In removing nesting material it should be burned rather than merely thrown upon the ground and left for Sparrows to carry away in the formation of new nests.

#### EUROPEAN STARLING

The European Starling (see Fig. 3) is a comparatively newly introduced bird in America, which multiplies rapidly, and to which your Ornithologist has called attention in previous reports. In appearance it is very much like the Blackbird, or female Cowbird, and in habits may be said to be intermediate between our ordinary Blackbird and the English Sparrow. During the recent cold weather the Starling was seen in large flocks in the eastern part of the State. It is supposed that they came from the region between New York City and Philadelphia, where they have recently been multiplying. It is our opinion that the Starling is a good seed-eater, which will prove to be as objectionable as the English Sparrow, and it should, therefore, be known and destroyed. It lives and feeds mostly in open fields, and can be recognized by its single short whistle or note.





Fig. 2. English Sparrow.  
1. Male. 2. Female.



Fig. 3. Starling.







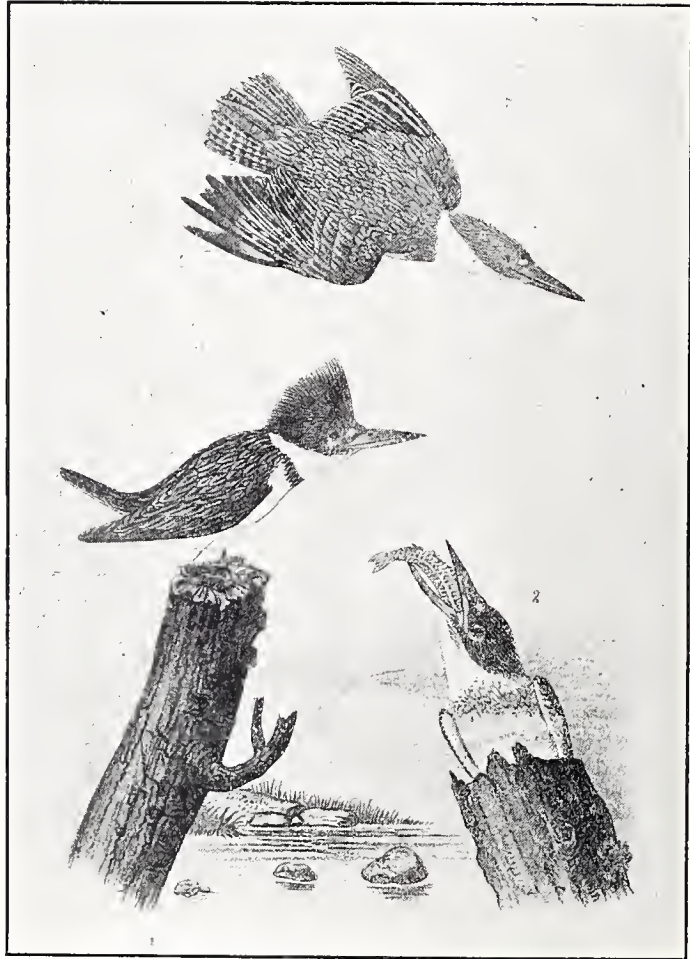


Fig. 4. Belted Kingfisher.

1. Male.

2. Female.





Fig. 5. Logger-headed Shrike.  
1. Young. 3. 4. Adult.

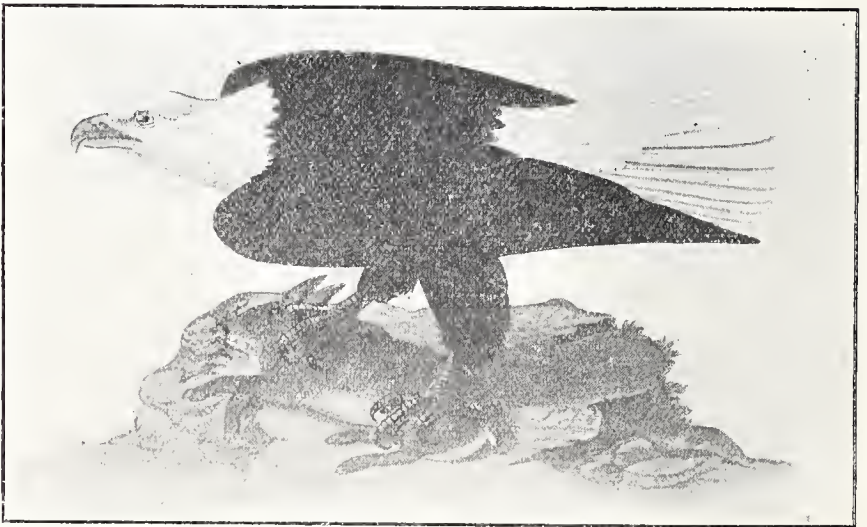


Fig. 6. Bald Eagle.  
Adult.



## KINGFISHER

The Kingfisher (see Fig. 4) is doubtless on the black list because it destroys fishes; but as all "suckers" are not alike, so all fishes are not the same kind. A careful study of its habits shows that it feeds mostly upon minnows, suckers and other soft-rayed or slow fishes, which are in turn the enemies of the eggs of the higher or spiny-rayed fishes, such as the perch, bass and pickerel, which are really the fine game fishes. The trout is too wary to be caught by Kingfishers, except where they are kept in artificial conditions, as in ponds, where they do not have opportunity for natural concealment. This bird is one of the most beautiful and interesting in the natural elements in landscape scenery, and from a scientific, as well as an esthetic standpoint, is worthy of preservation.

## THE SHRIKE

As a matter of fact, there are two species of Shrikes liable to occur in Pennsylvania. One is the Great Northern Shrike or the Butcher Bird; the other is the Southern Shrike, and is also called the "Loggerhead." (See Fig. 5). These are Passerine or Perching Birds, which have acquired the raptorial habit. They live like small hawks. They are peculiar in the fact that they will kill insects, frogs, mice, small birds, etc., and hang them in bushes or impale them on thorns near their nests or in other favorable storage places. They appear to do this in times of plenty, in order to establish larders upon which they can draw in periods of scarcity.

During the winter we have not infrequently found large grasshoppers impaled upon thorns where the Shrikes had evidently placed them during the previous summer. While it is possible that they may feed upon a few small birds, like our native sparrows, and thus may be objectionable, we do know that they are among the great enemies of mice, the large insects of many kinds, and the English Sparrow. We have seen them pursue the latter with the tenacity of the hound following its prey, until the Sparrow became so fatigued that it would attempt to seek protection in a bush, there only to be sought out and killed by the Shrike.

This bird generally breaks away the skull of its victim, eats its brain, and hangs its remains upon a spine, or in the small fork of a bush. Because of its value in destroying mice, insects, and the English Sparrow, we regard it as more beneficial than obnoxious, and regret that the laws of man have seen fit to place this bird upon the black list.

## THE EAGLE

The law does not state which of the different species of Eagles are to be unprotected in this State. The two most commonly found, though rare, are the Golden Eagle and the Bald Eagle. (See Fig. 6).

The stories of the Eagle carrying away children are, so far as we can learn, almost always unfounded. These birds live mostly along the seashore, where fish can be obtained, or scattered in the mountainous districts. As long as the Bald Eagle is the "Emblem of our Country," it is entitled to our respect and efforts at protection.

## THE BUZZARD

By a remarkable turn of events, the Turkey Vulture or "Turkey Buzzard" (see Fig. 7) which was once among the most carefully protected of birds, has now become an outcast, seeking a friend. This is because science has revealed the fact that this bird, which feeds solely upon dead animal material, may carry the germs which cause death, and spread them to other parts of the country, thus facilitating the spread of disease. In the streets of some of the Southern cities, such as Charlestown, S. C., the Turkey Buzzard can be seen as much at home as "chickens in our gardens." They are there protected because of their value as scavengers, and in the economy of Nature we certainly believe them to be properly recommended. If they are so serious in effects as to justify extermination, this should be the sentence; but we believe it far better for our State to pass a law providing for the proper and immediate disposal of the bodies of all domesticated animals that die from contagious or infectious diseases, rather than for the destruction of the Turkey Buzzard, because he may, perchance, in rare instances, spread such disease when performing his natural duties as scavenger and thus filling its place in an infinite plan. Especially is this true when we remember that germs of such diseases are liable to spread by several other means, such as contaminated water, crows, dogs, winds, etc. As the term "Buzzard" is accurately applied to the Hawks of the genus, *Buteo*, are wondering why our State does not change the name to "The Turkey Buzzard," which belongs to the family of Vultures, if this is the bird that it was intended to legislate against?

## THE OSPREY

The Osprey or Fish Hawk is rare in this State, but rather common along the Atlantic Coast. (See Fig. 8). We wonder how many farmers in Pennsylvania ever saw a live Osprey? Certainly but few. We are also wondering how many Pennsylvania fishes were destroyed during the past year by the Osprey. Certainly far fewer than were kept from coming up-stream by means of the McCall's Ferry Dam, with its geometrical puzzle called a "fishway." We are wondering if it is advisable to legislate against a bird so interesting, and also so rare, and so absolutely innocuous to the farmer as the Osprey or Fish Hawk!

## SHARP SHINNED HAWK

Among the hawks on the black list are the Sharp-shinned (see Fig. 9) which is sometimes wrongly called the "Pigeon Hawk;" the "Cooper's Hawk;" sometimes called the "Chicken Hawk;" the Goshawk, which is sometimes called the "Blue Hen Hawk;" the Duck Hawk, and the Pigeon Hawk. Among the hawks protected by law are the Sparrow Hawk, Kites, Marsh Harrier, Red-tailed Hawk, commonly called the "Hen Hawk," Red-shouldered Hawk or Buzzard, Swainson Hawk, the Broad-winged Hawk, and the Hough-legged Hawk. Among these are the most common of the larger hawks in Pennsylvania.



Fig. 7. Turkey Buzzard or Vulture.



Fig. 8. Osprey or Fish Hawk.



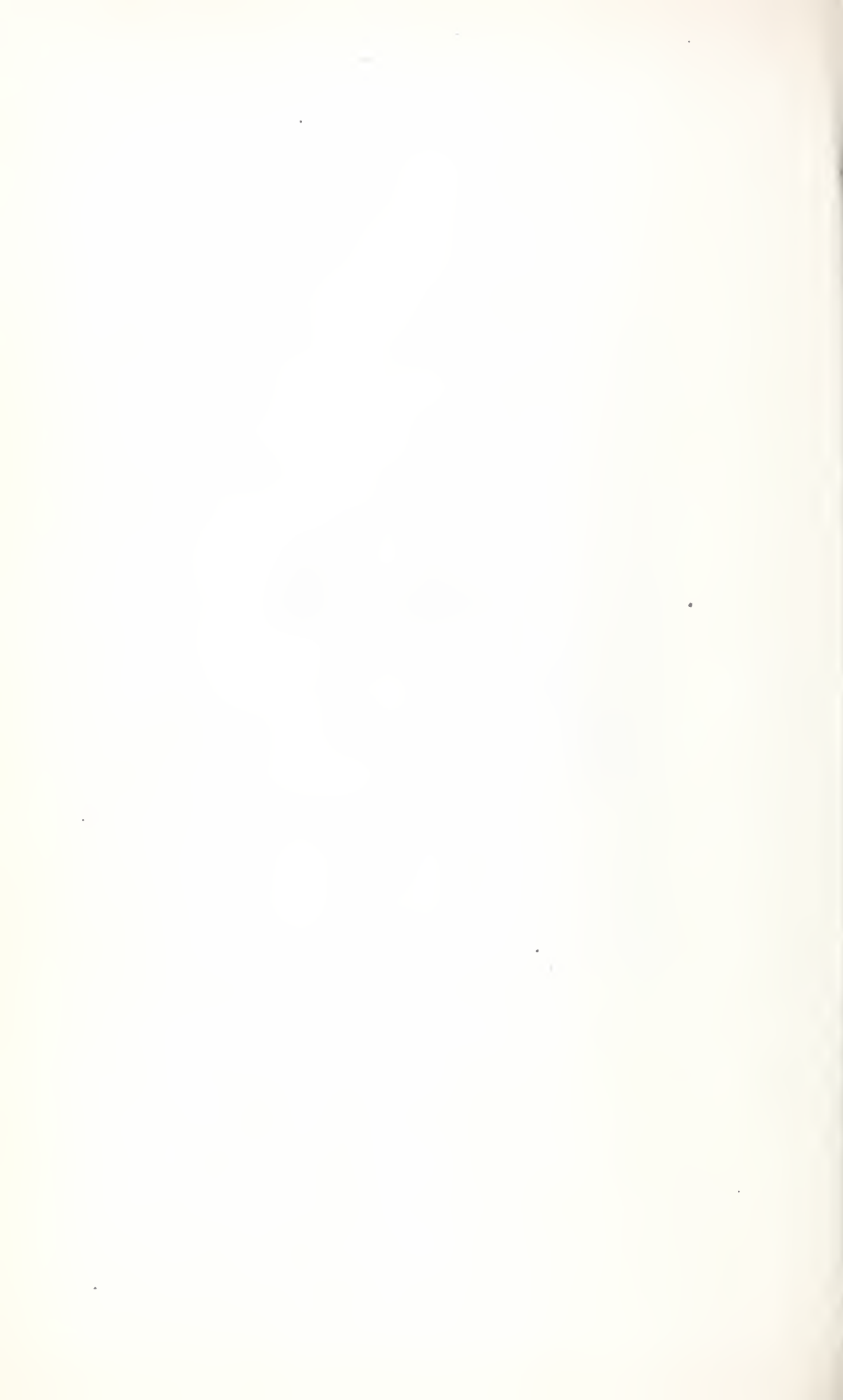




Fig. 9. Sharp-shinned Hawk.

1. Male.

2. Female.





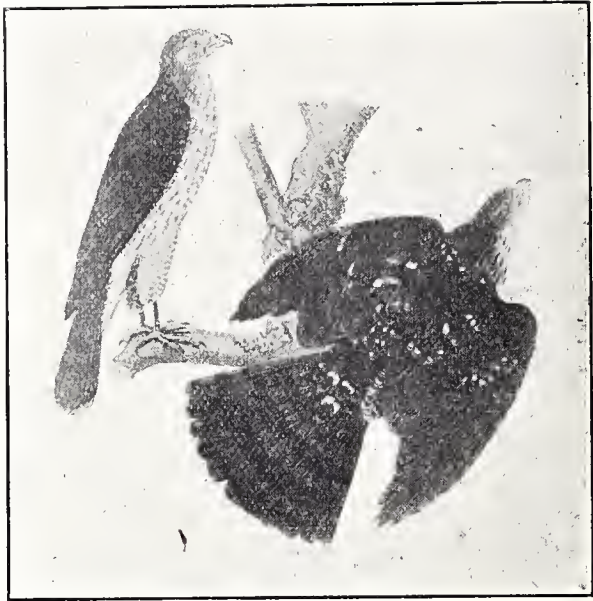


Fig. 10. Cooper's Hawk.

2. Male.

3. Female.

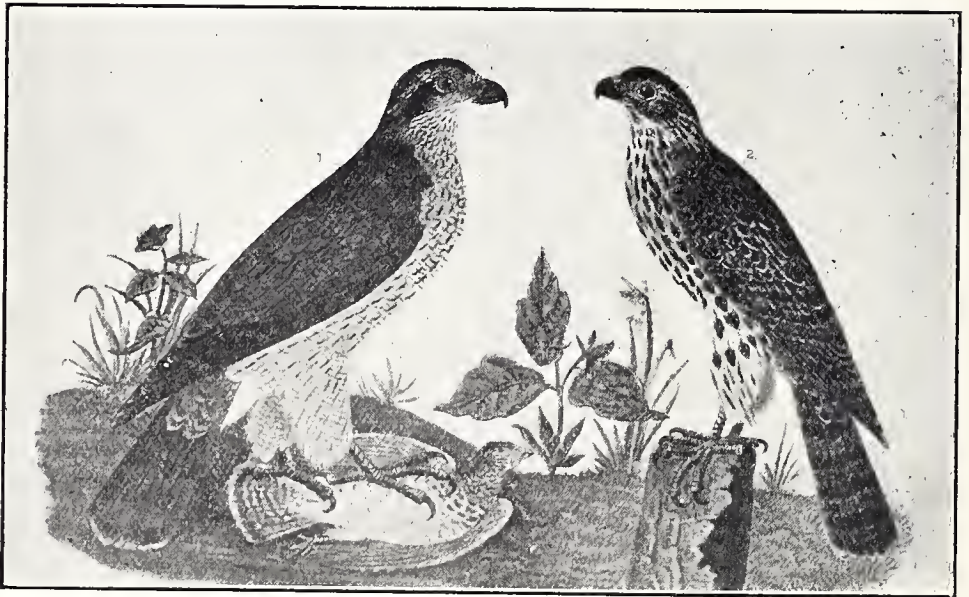


Fig. 11. American Goshawk.

I. Young.

3. 4. Adult.





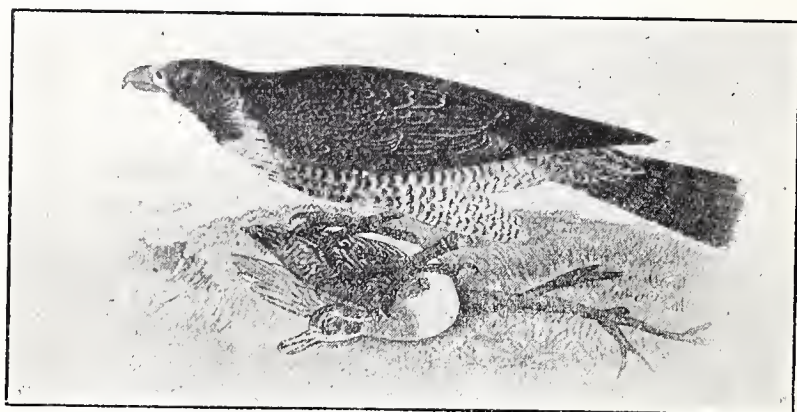


Fig. 12. Duck Hawk.



Fig. 13. Pigeon Hawk.





Fig. 14. Great Horned Owl.

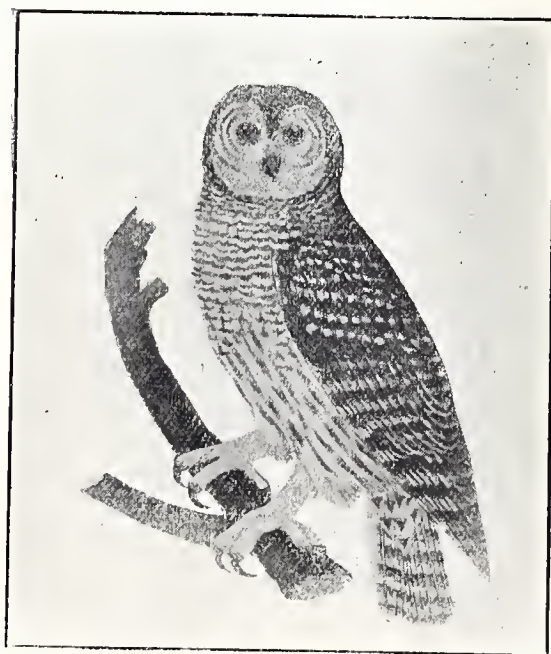


Fig. 15. Barred Owl.



## COOPER'S HAWK

It is evident that the reason for placing the Sharp-shinned Hawk and Cooper's Hawk (see Fig. 10) on the black list is that these birds sometimes destroy poultry or smaller birds, but, in truth, they are among the most effective enemies of the mice and English Sparrow, and are not always enemies of poultry. Their economic results would probably justify their extermination.

## THE GOSHAWK

The Goshawk (see Fig. 11) is with us in the winter only, and feeds chiefly upon rabbits and the game bird known as the Ruffed Grouse, and, in this State, wrongly called the "Pheasant." It also occasionally feeds upon poultry during the winter, but is not with us in the summer. It is probable that this hawk is justly under the legal ban, yet horticulturists who are suffering the loss of their trees from the devastation of numbers of rabbits would, indeed, welcome it in their young orchards.

## DUCK HAWK

The Duck Hawk (see Fig. 12) once fed almost entirely upon wild ducks, and as these have become very rare, it likewise has become very rare in this State. It now feeds mostly upon small birds and mice. It is one of the most beautiful birds, but so rare that the occurrence of it in Pennsylvania would be justification for scientific record. There is absolutely no need of a law protecting a bird that is so nearly exterminated as the Duck Hawk.

## PIGEON HAWK

The Pigeon Hawk (see Fig. 13) is a species of Falcon, and is supposed to be black-balled because it feeds on pigeons and small birds. However, it is a great enemy of mice, rats and young rabbits, and insects, and thus has its good as well as its bad points, with the former predominating. The United States authorities have published "Though they feed on the flesh of birds, they destroy enough insects and noxious mammals to partially offset the injury they do."

The Red-tailed Hawk and Red-shouldered Hawk are among our most abundant of the larger hawk. Both of these are commonly called "Hen-Hawks," but at the present time both are properly on the list of birds protected at all times in the State of Pennsylvania.

## THE OWL

Among the Owls that are unprotected are the Great-horned Owl (see Fig. 15) which is sometimes called the "Hoot Owl," and also the Barred Owl. It is difficult to tell why the Barred Owl, the Long-eared Owl, the Short-eared Owl, the Great Grey Owl, and the Snowy owls are not found on this list, together with the two other owls mentioned, but we are glad that the list of owls mentioned is short. It is probable that the Great-horned Owl is legislated against because it occasionally eats poultry and rabbits, but we do know that it is a good rat-killer and a very influential enemy of the Skunk. The Barred Owl is probably on the black list because it occasionally takes rabbits, although it feeds much more upon rats and mice, and

is not nearly so serious in its detrimental effects as is supposed. Where poultry is not permitted to roost out in trees, being kept under a roof at night, as they should be, the owls do not harm them. We regard it as more important to protect poultry by shelter than by legislation.

We hope that the other owls named here, as well as the little Screech Owl, which is the enemy of the English Sparrow and house mice, will never be placed on the list of unprotected birds. Gunners should remember that there are more kinds of owls and hawks found in the State of Pennsylvania that are protected by law at all times of the year, than there are that are unprotected.

#### THE CRANE

Among the wading birds that are unprotected by law, are the Crane, Heron and Bittern. It is impossible to tell just what is meant by the Crane. There are two species of Cranes found in the United States. Both are Southern birds. The Sand Hill Crane lives chiefly in the Southwestern part of the United States, and is not known in Pennsylvania. The White or Whooping Crane (see Fig. 16) is also a Southern bird, and on very rare occasions may stray into Pennsylvania as a straggler. It can be said of it that it eats fishes, frogs and other aquatic creatures, but it is probable that its attacks on fishes are confined chiefly to those that are sluggish and easily captured, or slow-moving species, which, in turn, feed upon the eggs of the wary, quick-moving, spiny-rayed fishes, like the bass, the perch, the pike and their allies. At least, it can be said that the White Crane is altogether too rare and interesting to call for anything else than our most serious efforts for its protection, when it is wafted into this State, apparently by the Southern breezes, and should then become an object of intense interest and study for our school children.

#### THE HERON

There is no one bird known as the "Heron," and the law does not state that the Herons are unprotected by law. We think it better that it be specific and make a statement as to what species of Herons are to be unprotected. Among Pennsylvania Herons are the Great Blue Heron, the Little Blue Heron (see Fig. 17), the Green Heron, and two species of night herons. All these are wading birds, feeding mostly upon aquatic creatures and taking chiefly more or less soft-rayed fishes. However, the Great Blue Heron has been quite effective as an enemy of gophers and other rodents which live in the ground, and which it has been seen to capture and destroy. From the stomachs of different species of herons, we have taken insects and cray fish to a great extent, showing that they feed on something else than fishes and there is justification, from the economic standpoint, in their preservation.

#### THE BITTERN

The "Bittern" is a term likewise used in the generic manner, for which there is no one bird. There are two species of bitterns found in this State. One is known as the Indian Hen, or American Bit-



Fig. 16. White Crane.







Fig. 17. Blue Heron.





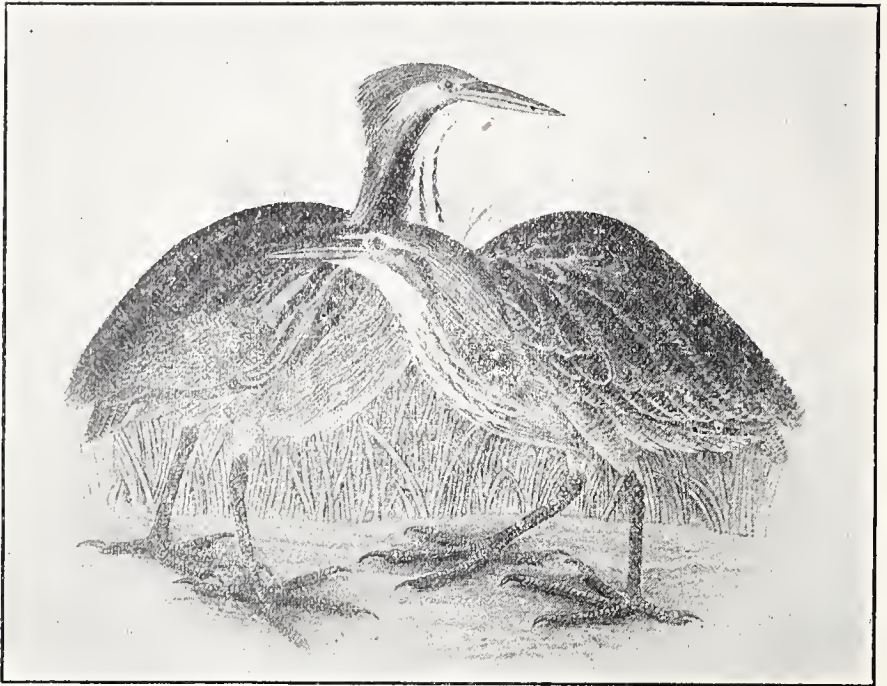


Fig. 18. American Bittern.



Fig. 19. American Crow.



tern; (see Fig. 18) and the other is called the Least Bittern. Their habits are similar to the various species of herons mentioned, and there is no more justification in exterminating the Bitterns than the Herons.

#### CROW AND RAVEN

The unprotected list ends with two birds which are, indeed, black in color as well as reputation. These are the Crow and the Raven. (See Fig. 19). We all know that the crow presents a very objectionable habit in eating corn from fields in the spring of the year, and again before it is husked in the fall, but we should likewise realize its value as an insect destroyer. Not many weeks ago, a Mr. Lee, of Bedford county, reported to the writer that last spring, as he was plowing his corn ground, crows in great numbers followed him closely, and would fly from one side of the field to the other, in order to walk in the furrows, and travel over the freshly-turned soil. They were constantly feeding in great numbers. He said that he examined the soil, and found worms, grub worms and wire worms, so very abundant as to be quite alarming, and he felt that he would lose his crop; but he permitted the crows to remain and feed on these insects. Later in the summer it was found that his crop had been effectively protected by the crows well cleaning up the larvae in the soil, while his near neighbors who did not have the crows feeding at the time of plowing, lost their first planting entirely, and were obliged to plant again.

The crow is a suspicious bird, and its injuries to sprouting corn can be avoided by first soaking the corn in water containing a teaspoonful of tar dissolved in each gallon. The bitter taste thus imparted to the corn is enough to make the crows let it alone.

The raven is a rare bird, living only in wild and mountainous regions of this State, and is of such peculiar interest and scarcity as to justify its preservation.

Let us now ask if it is worth while for mankind to attempt to throw his influence in the balance of Nature, as though in his wisdom the twenty species of out-lawed Pennsylvania birds were created in vain. Did not the Almighty create a natural equilibrium, and is it not our duty to maintain it? What is the experience of our farming friends who live where they are best adapted to making observations? Are destructive insects decreasing owing to the suppression by birds and the operation of laws in decreasing the numbers of birds of the kinds above mentioned? Are the song birds and insectivorous birds increasing, due to the absence of these supposed enemies of birds? In regions where hawks and owls are but rarely seen, and, in fact, where the birds mentioned above are less abundant, the song birds and insectivorous birds are likewise most reduced in numbers. Are the ravages by rats and mice growing less? Would not the Balance in Nature be better maintained if mankind would better understand and preserve the enemies of these things? Is it at least not worth while that we should study both sides of the question, even though we may have to acknowledge that our present Game Laws pertaining to birds are about as nearly correct as it may be possible to make them?

This report is to place the other side of the subject of these creatures before the public, showing their place in Nature, which may not have been fully recognized when they were placed in a wholly unprotected list.

While we have based the above report on economic features alone, we should call attention to the ethical and educational value of our birds. Who has not been inspired by the free and open song of a wild bird, now too scarce? Seriously, who would be willing to see the twenty black-listed birds named above forever exterminated in this State. In addition to their cash value, we should make an appeal for the birds on account of the uplift they give us. The bird lover, on the wings of the bird he loves, in some true sense, is lifted up, up, up, where the Alps on Alps rise, to those far heights where he could never climb alone, and this was the feeling in the heart of the poet Bryant, when he watched the wonderful waterfowl take her flight and cried out:

"Thou'rt gone, the abyss of heaven  
Hath swallowed up thy form; yet on my heart  
Deeply has sunk the lesson thou hast given,  
And shall not soon depart.

"He from zone to zone,  
Guides through the boundless sky thy certain flight,  
In the long way that I must tread alone,  
Will lead my steps aright."

The CHAIRMAN: What shall be done with this report?

MR. HUTCHISON: I move it be received and published with the proceedings of the Board.

This motion was properly seconded and duly carried in the regular way.

MR. HUTCHISON: I see Mr. Halberstadt has come in.

The CHAIRMAN: We will then take up the Report of the Mineralogist, by Baird Halberstadt, of Pottsville.

This report was as follows:

## REPORT OF THE MINERALOGIST

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By BAIRD HALBERSTADT, F. G. S.

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In the short time allotted, it would be idle to attempt to give an account of all the minerals found within the confines of the great State of Pennsylvania, so abundantly has it been endowed, exceeding in mineral wealth perhaps that of any other state in the Union.

Within it are found the great Anthracite coal fields, exceeding in value and extent those of any known anthracite fields in the world. The Connellsville coking coal, surpasses in value the coal of any other developed region in the United States for the manufacture of

coke. Nor have we anywhere in this great country of ours a coal for illuminating gas making purposes that excels or even equals that mined in the Westmoreland-Youghiogheny gas coal region embraced in the western townships of Westmoreland and southeastern townships of Allegheny counties. Many of the mines in Clearfield, Cambria and Somerset counties produce ideal steam coals.

#### ANTHRACITE COAL

The anthracite region produced in 1910, 75,331,413 long tons which, with that dredged from the rivers (91,833 tons), makes up a total of 75,433,246 long tons or 84,485,236 short tons, whose spot value was \$160,275,302, or nearly three times the value of the entire coal product of West Virginia, the second state in rank as a coal producer.

#### BITUMINOUS COAL

The tonnage mined from the Bituminous coal fields of Pennsylvania in the same year was 150,521,526 short tons or more than double that of its nearest competing state, West Virginia. The spot value of this tonnage was \$153,029,510. The spot value of Pennsylvania's total tonnage for 1910 was \$313,304,812, while that of the United States was \$629,557,021. Pennsylvania produced 46.8 per cent. of all the coal mined in the United States in 1910. The tonnage of the entire country was 501,596,378 tons of which amount Pennsylvania produced 235,006,762 short tons or more than three and a half times as much as any other state. In fact, the production of coal in Pennsylvania in 1910 exceeded the combined tonnage of West Virginia, Illinois, Ohio, Indiana, Alabama, Kentucky, Colorado, Iowa, Wyoming, Tennessee, Virginia and Missouri by over 50,000 tons. To mine, prepare and ship this tonnage of Pennsylvania required an army of 344,900 men and boys.

It is more than of passing interest to know that the United States mines nearly 40 per cent. of the annual output of the entire world. Pennsylvania and West Virginia produced more coal in 1910 than Great Britain; Pennsylvania's production was but 10,036,538 tons less than that of Germany.

#### COKE

Pennsylvania produced in 1910 more than 60 per cent. of the entire coke output of the United States, its production being 26,315,607 short tons, valued at \$55,254,599. The quantity of coke manufactured in the United States was 41,708,810 short tons, valued at \$99,742,701; more than 50 per cent. of all the coke ovens in the country are in Pennsylvania.

#### PETROLEUM

Although Pennsylvania produced the first petroleum on a commercial scale from a well at Titusville in 1859, and long remained the leading oil producing state, it has dropped from the first to the seventh in rank of oil producing states.

The total production of petroleum in the United States in 1910 was 209,556,048 barrels, valued at \$127,896,328. Of this amount,



Pennsylvania produced 8,794,662 barrels, valued at \$11,908,914. Although seventh in rank as a producer, Pennsylvania stands fifth as to the value of its product.

Up to 1876, Pennsylvania and New York were the only states producing petroleum on a commercial scale. In that year, Ohio, West Virginia and California took their places as producers. These were followed by Kentucky and Tennessee in 1883, Colorado in 1887, Indiana and Illinois, Kansas, Texas and Missouri, Oklahoma in 1891, Wyoming in 1894, Louisiana in 1902.

California (34.84 per cent.), Oklahoma (24.83 per cent.), Illinois (15.82 per cent.) in 1910 produced over 75 per cent. of the entire petroleum output of the United States. In 1859, the total production of petroleum in the United States was but two thousand (2,000) barrels.

The production in 1910 was over one thousand times greater than it was in 1859, and in value had jumped from \$32,000 to \$127,896,328.

#### NATURAL GAS

The production of natural gas of the United States in 1910 was 509,155,309,000 cubic feet; its value was \$70,756,158. The production of this valuable fuel in Pennsylvania amounted to 126,866,729,000 cubic feet, valued at \$21,057,211.

In addition to the enormous production of her own, Pennsylvania consumed over forty-two billion cubic feet drawn from other states. It will be observed that the value of gas produced in Pennsylvania was nearly double the value of the petroleum produced in the State in the same period.

#### IRON ORE

The production of iron ores in the United States in 1910 amounted to 56,889,734 long tons. Of this amount, Pennsylvania produced 739,799 tons as follows:

Hematite, 846 tons; brown ore, 106,544 tons; Magnetite, 632,409 tons. The production of hematite in 1910 was but 16.4 per cent. of the production in 1909. The brown ore production showed an increase of 25,829 tons. The production of magnetite showed an increase of 51,379 tons in 1910 over the production of 1909.

The value of iron ore mined in Pennsylvania in 1910 was \$911,847. Minnesota, Michigan and Alabama produce over 88 per cent. of the total production of the country.

Pennsylvania's quota was but 1.3 per cent. of the whole.

With the single exception of New Jersey, Pennsylvania produced more magnetite than any other state in the Union. This ore mined at the Cornwall ore mine in Lebanon county formed 24 per cent. of the entire production of the United States for that year.

As an iron ore producing State, Pennsylvania is seventh in rank, but in the value of product, it is outranked by eight states.

#### ZINC

Although there are many localities in the State at which zinc blende is found, I find no return made of this as a commercial product in 1910, from Pennsylvania. The New Jersey Zinc Company has an extensive smelting plant at Palmerton, but the ores smelted are mined in New Jersey.



## COPPER

Several mines in Adams county are reported as producing copper, while in Lebanon county, blister copper is produced at the Cornwall iron ore mine. The production amounted to 740,626 pounds. There were produced, in addition to this amount from all sources including old slags, smelter cleanings, precipitates, etc., 186,734 pounds, making a total production in the State of 927,360 pounds. If the average price per pound (12.7c) be used as a basis, the value of the copper production of Pennsylvania in 1910 was \$117,774.72.

## GRAPHITE

During the year 1910, Pennsylvania produced 696 tons of crystalline graphite, valued at \$82,194. This product was mined in Chester county. Graphite was formerly mined at Boyertown and Mertztown but these mines are, at present, not producing.

## STONE INDUSTRY

Pennsylvania leads all other states in value of its production of stone of various kinds. These include Granite, Trap Rock, Marble, Sandstone and Limestone. The value of its limestone product exceeded that of any other state. The total value of the various kinds of stone produced in 1910 was \$8,621,937 as against \$76,520,584, the value of the production of the United States; Pennsylvania's quota being 11.27 per cent. of the whole.

## FELDSPAR

The production of feldspar in Pennsylvania in 1910 was 15,091 tons, valued at \$104,751. The mining of feldspar in Pennsylvania is confined to Chester and Delaware counties.

## QUARTZ

The quartz industry of Pennsylvania is confined to Adams and Chester counties, there being in 1910 but two producers, the Columbia Flint Company of Marietta, and H. T. A. Rhodewalt of Chester county. The quality and value of the product mined are not available for publication, but the combined production of Pennsylvania and Maryland was 13,588 tons, valued at \$71,864.

## SAND AND GRAVEL

The sand and gravel produced in the United States in 1910 amounted to 69,410,436 tons and was valued at \$21,037,630. Of this amount, Pennsylvania produced 5,676,509 tons, valued at \$2,974,221. The quantity of the said was 4,253,163 tons valued at \$2,607,215. Of gravel, there were produced 1,423,347 tons, valued at \$367,006.

The classification of the sands is as follows: Glass-sand, Moulding, Building, Fire, Engine, Furnace and other sands. More sand and gravel were produced in 1910 than in any year previous to this.

## PORTLAND CEMENT

In 1910, the total production of Portland cement in the United States was 76,549,951 barrels, valued at \$68,205,800. Pennsylvania is again in the front rank, its production being 26,675,978 barrels, valued at \$19,551,268. It produced over three times as much Portland cement as its nearest competitor (Indiana).

## NATURAL CEMENT

The output of Natural cement has rapidly declined and will probably continue to do so until better methods of treatment can be found whereby the natural cement can be made equal in tensile strength to that of the best grades of Portland cement.

In the production of Natural cement, Pennsylvania produced but 196,331 barrels as against 304,598 barrels produced in New York. But ten (10) states produce Natural cement as against twenty-six (26) producing the Portland brand.

## PUZZOLAN CEMENT

The production of Puzzolan cement, prepared by mixing slaked lime and furnace slag is, like the Natural cement, declining. Of the four (4) plants reported, one of these is in Pennsylvania. As there is but a single plant in Pennsylvania, neither its production or value of its product can, for business reasons, be given.

## CLAY PRODUCTS

The total value of the clay products of Pennsylvania in 1910 as shown from the reports of the Clay working industries was \$22,094,284. Ohio was the only state whose products exceeded in value those of Pennsylvania.

Brick, including the common, vitrified and front varieties, were manufactured to the number of 1,101,448,000, valued at \$8,578,389. The value of the fire brick produced was \$6,545,928, or a combined value of all variety of brick, except the enameled, of \$15,033,317.

## SLATE

The value of roofing, mill stock and other slates produced in the United States in 1910 was \$6,236,759. The value of Pennsylvania's production was \$3,740,806 or nearly 60 per cent. of the whole. Pennsylvania not only stands first in the rank of producers but her product exceeds in quantity and value that of all other states combined.

The four counties from which this product is quarried are Northampton, Lehigh, York and Carbon. The school and blackboard slates are produced only in Lehigh and Northampton counties, because of the fine cleavage of these slates for this particular purpose.

The slate quarried in Carbon and York counties is used for roofing purposes, while that of both Lehigh and Northampton can be utilized for both roofing slate and mill stock.

## TALC

Talc was mined and shipped by three operators in Pennsylvania whose plants are all in the same vicinity. New Jersey has but a single operator. The combined tonnage of Pennsylvania and New Jersey

in 1910 was 13,192 tons, valued at \$62,833. The greater part of this tonnage was mined in Pennsylvania.

#### MINERAL PAINTS

##### Ochre

The production of ochre in 1910 in this country was 11,711 tons, valued at \$112,445 to which amounts Pennsylvania contributed 3,642 tons, valued at \$32,254 or 31 per cent. of the quantity and 29 per cent. of the value.

The total quantity of Umber and Sienna mined in the same period was 1,015 tons, the greater part of which was produced in Pennsylvania.

The production of metallic paints in Pennsylvania was 8,063 tons, valued at \$91,714.

Pennsylvania produced of mortar colors 2,711 tons, valued at \$33,752, as against 9,960 tons, valued at \$107,780 for the entire country.

#### SLATE AND SHALE

A considerable quantity of slate and shale are annually ground up for use in pigments and as fillers. In 1910, the individual figures of State production are not available; Pennsylvania's production, however, places the State in the front rank.

#### MINERAL WATERS

From forty-four springs in various counties of the State, Pennsylvania produced in 1910, 2,536,337 gallons of mineral water, valued at \$221,685.

The standing of Pennsylvania is as follows: In the number of springs, third (3rd), quantity sold, fifth (5th); in total value, eighth (8th).

#### SALT AND BROMINE

A considerable quantity of both salt and bromine were produced in Allegheny county, Pennsylvania, but unfortunately, both the quantity and value are not available for publication.

#### LIME

Pennsylvania, in 1911, burned more lime than any state in the Union; Ohio ranking second with a production of less than one-half that of Pennsylvania.

The quantity of lime burned in the United States was 3,481,780 short tons, valued at \$13,894,962. This was produced by 1,125 operators. Pennsylvania's contribution made by 572 operators was 877,714 short tons, valued at \$2,440,350.

The average price per ton was \$2.78, as against an average of \$3.99 for the entire country. The highest price per ton was \$9.65, the average price of lime in Oregon.

#### POTASH SALTS.

It will be interesting to the farmers of Pennsylvania to know that an investigation has for some time and is still being pursued to learn of any and all sources in the United States from which potash

can be derived. It is to be hoped that a successful termination of the investigation will occur and that our country will supply all the demands and that recourse may not be then necessary to import this needful fertilizer, so necessary to the farmer, from foreign lands.

The figures given in this report have been derived from the Division of Mineral Statistics of the U. S. Geological Survey.

The CHAIRMAN: What is the pleasure of the Board on this report?

MR. HUTCHISON: I move it be received and published with the proceedings.

This motion was properly seconded and duly carried in the regular way.

The SECRETARY: There is another item on the program which is of great importance to the people of Pennsylvania, and I hope every one will remain to hear what Prof. Cochel has to say about the raising of beef cattle in Pennsylvania. The time has come when I think Pennsylvania farmers will have to turn their attention in this direction, and for that reason Prof. Cochel has been asked to give us this report.

MR. JOEL A. HERR: The Memorial Committee is ready to report at this time if it be the pleasure of the Board.

The CHAIRMAN: We will have the report of the Memorial Committee.

This report, read by Mr. Joel A. Herr, is as follows:

## REPORT OF THE MEMORIAL COMMITTEE

Harrisburg, Pa., Jan. 25, 1912.

Again we are called upon to record the removal by death of two of our associates in the agricultural field of our State, Gabriel Hiester, of Dauphin county, and J. F. Johnson, of Fulton county.

Gabriel Hiester was born on the ancestral acres on which he died, April 28, 1850, his death occurring January 19, 1912. He was graduated at Pennsylvania State College in 1868 at the age of 18 years. His father was one of the founders and until his death, one of its honored trustees. Mr. Hiester was graduated in the course in Agriculture and returned to his father's farm and carried on advanced general farming, specializing in Pomology, in which he became an authority.

He became a member of the Pennsylvania State Board of Agriculture, also a member of the then Fruit Growers' Association in 1882, serving in the Board for many years as a member and officer, and for many years as its Pomologist. He continued a member and was President of the State Horticultural Society at the time of his death.



In addition to the original homestead, he purchased a farm in Perry county, Pa., and converted it into a fruit farm in which he succeeded in growing apples and peaches and cherries, giving an important object lesson to our fruit growers.

He has been a prominent Trustee of Pennsylvania State College since 1879, and served for many years on its Executive and Advisory Committee. His was a master mind which was shown in every line of work he pursued.

When the history of Pennsylvania agriculture is written, the name of Gabriel Hiester will be in the foremost rank of its progressive members.

He was a man of unbending integrity and a high sense of honor; courageous and aggressive, yet courteous and affable, he possessed the qualities of a great leader. His death is not only a loss to the Board, but to the entire State.

Mr. J. F. Johnson was an active member of this Board for two consecutive terms, a prominent citizen and farmer of Fulton county. He died at his home, in February 1911, aged about 54 years. While a member of this Board, he was a regular attendant and interested in its work.

We desire to express our loss by the demise of these co-workers, and extend our sympathies to their bereaved families.

We ask that this report be spread upon the minutes of this Board and a copy be sent to the bereaved families.

J. A. HERR,  
JAS. A. BEAVER,  
A. J. KAHLER,  
HENRY C. SNAVELY,  
MATTHEW RODGERS,  
Committee.

SECRETARY CRITCHFIELD: It was my pleasure to know both of the gentlemen who have passed away within the last year, and in regard to Mr. Hiester, I may say that I knew him very well. It has been my privilege to meet him at a number of public gatherings, and I also have had the pleasure as well as privilege of meeting him repeatedly at his own home.

Mr. Hiester was, as has been already said, a gentleman in his instincts and manners, a man whom no one could know well or intimately, without having been made better by acquaintance and association with him.

He was a great lover of Nature, and wherever he went, he could see something to admire—the fruit and flowers, the mountains, the great gulches cut through them and the beautiful river that flowed by his home were full of interest to him. He often called my attention to them and spoke of their rugged beauty. All these were pictures that to him were worthy of special admiration and attention.

Mr. Hiester was a true friend. I doubt whether I ever knew a man who was more loyal and devoted to his friends than he; and while he loved to attend the meetings which it was his official duty to attend, on account of the opportunity it afforded him to serve the generation to which he belonged, he also appreciated the privilege it afforded of meeting his friends.

As a husband and father, he was devoted and affectionate. All his thoughts seemed to embrace the good of those who belonged to his household. I have been to his home since the illness of his wife, which has been very severe within the past few months, and I noted the tender regard he manifested for her and his constant solicitude for her comfort. Before the last meeting of the Trustees of State College I called on him personally to see if he could go to the meeting. I knew how much he delighted to be there, how he loved his Alma Mater, and how dear to him were all her interests, but he said, "Mr. Secretary, there is nothing that would give me greater pleasure than to go, if all was well at home, but my duty at present is here with my afflicted wife." It may be said, therefore, that he possessed that best of all traits—deep, earnest affection for those who, under God, were placed in his charge.

I feel that in the death of Mr. Hiester I sustain a personal loss. No man who has a proper sense of duty can occupy a place of responsibility without feeling the importance of having some one near at hand, in whom he has confidence, to whom he can go for counsel. On more occasions than one, have I gone to Mr. Hiester, to talk over with him and get his view upon some matter of interest to the Department that is under my charge, and I always found him ready to lend his counsel and aid.

It gives me pleasure to bear this testimony to the noble qualities of our departed friend.

We shall all miss him; if we who only occasionally had the privilege of grasping his hand and receiving his cheerful salutation, so regard our loss, who can estimate the burden of grief that has fallen like a shadow over his home, crushing the hearts of those who were near to him by the ties of nature and constant association, and it is most fitting that in these resolutions we express our sympathy for his loved ones left in the home that is made desolate by the great loss that has come to us all.

MR. A. P. YOUNG: I have a tribute I should like to bring. It is a little poem I have admired ever since my schooldays:

"There is no death! The stars go down  
To rise upon some fairer shore:  
And bright in heaven's jeweled crown  
They shine for evermore.

"There is no death! The dust we tread  
Shall change beneath the summer shower  
To golden grain or mellowed fruit,  
Or rainbow tinted flowers.

"The granite rocks disorganize,  
And feed the hungry moss they bear;  
The forest leaves drink daily life  
From out the viewless air.

"There is no death! The leaves may fall,  
And flowers may fade and pass away;  
They only wait through wintry hours  
The coming of the May.

"There is no death! An angel form  
Walks o'er the earth in silent tread,  
He bears our best loved things away;  
And then we call them 'dead.'

"He leaves our hearts all desolate  
 He plucks our fairest, sweetest flowers:  
 Transplanted into bliss they now  
 Adorn immortal bowers.

"The bird-like voice whose joyous tones,  
 Makes glad these scenes of sin and strife,  
 Sings now an everlasting song  
 Around the 'Tree of Life.'

"Where'er he sees a smile too bright  
 Or heart too pure for taint or vice,  
 He bears it to that world of light  
 To dwell in Paradise.

"Born into that undying life  
 They leave us, but to come again,  
 With joy we welcome them—the same  
 Except their sin and pain.

"And ever near us, though unseen  
 The dear, immortal spirits tread,  
 For all the boundless universe  
 Is life—there are no dead."

MR. HUTCHISON: Mr. Hiester was one of my best and truest friends. I have known him for many, many years. We were thrown together quite a good deal. Our sons were schoolmates at College, they graduated in the Class of '98, his only son and my oldest son. His son visited my house and a friendship sprang up between the two boys, and led to a friendship between the fathers. He has been at my home. I traveled with him over the State to the Farmers' Institutes. I loved the man. I knew him very well. He always had a good word for everyone. I never heard him say an unkind word to any one. If he could not say a good word, he said nothing.

He was an authority on fruit culture. His name was known not only in our own State, but in adjacent states. His death is a distinct loss to the Commonwealth. I regretted when he left the Institute force, but he felt he could not leave his wife and daughters alone and travel over the State. He was a true friend in every way, and a true friend to State College, and what a loss to the College is his death! His father, as has been said was one of the earliest trustees of the College, and the son followed his father. He was much interested in the orchard established there, and took great pride in its development. But he has gone. We cannot bring him back. The only thing we can do is to endeavor to go where he is, and see him in another and happier world.

MR. JOEL A. HERR: I presume there is not one present who has had as long an acquaintance with Gabriel Hiester as myself. When I first came on the State Board of Agriculture in 1879, Mr. Hiester was quite a young man, but even then interested in fruit culture. Naturally this formed an opening wedge of the friendship between us and I always regarded him as a man of authority along these lines. I have visited him at his home and traveled with him to Farmers' Institutes. We have had him in my own home County of Clinton at Farmers' Institutes. He was one of the most sensible, high-minded, and yet affable and agreeable men I have ever known. He could not be approached with anything that was not entirely correct and proper. I doubt whether his word was ever questioned.



Everything he said, "went" and his neighbors all over the county looked up to him as a leader among men—which he certainly was. We don't appreciate what we have lost. Who is there in Pennsylvania to take his place? We have other good fruit men—men who make extravagant statements. You never heard Hiester make an extravagant statement. Whatever he said was plain, straight fact. He seemed to my mind, to possess all the elements of a great man, and the greatest pity is that he could not have lived—that he died in the prime of his manhood. He could have been of immense use to the Horticulture of this State, and I join in regret for his departure.

DR. HARVEY: Let me add, that while I did not know Mr. Hiester as well as some of you, I met him at some of our meetings and was very favorably impressed with him. He seemed to me to be a man to whom could truthfully be applied the words of Shakespeare:

"His life was gentle, and the elements so mixed in him, that all Nature might stand up and say 'This is a man.'" I have often heard a man say—a most eloquent preacher from Texas—"Oh, I like a *man*!" And that is all there is to this world, if we have a man's head and a man's character. We know, furthermore, that God has His own, and we will know them wherever they are. I came across a few lines the other day, which impressed me very strongly:

"He who believing strongly lays his hand  
Unto the work that waits for him to do.  
Though men should cavil, measures prove untrue  
Friends write their trusted promises on sand  
And failure mock him with its threatening hand,  
Still, in the end, he fearless shall pursue  
Till crack of doom, will find a power which few  
Or none with cause less righteous may command.  
For conquest is not built on the defeat,  
Of any man whose aim is human good,  
Who fights for justice hath already won,  
Before no show of loss shall he retreat.  
However crossed, maligned, misunderstood  
He knows but triumph, in the work, well done."

The CHAIRMAN: What shall be done with this report?

The SECRETARY: I move it be received and published in the journal of the proceedings.

This motion was properly seconded and duly carried in the regular way.

The CHAIRMAN: Now we will have the pleasure of listening to Prof. Cochel.

Prof. Cochel spoke as follows:

#### ADDRESS OF PROF. COCHEL

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Whenever a man has the labor and facilities that will permit him to go into the production of dairy products, it would certainly be a foolish thing to change from the production of dairy products to beef. On the other hand, we find in many other sections of the



State that are deficient in labor and have larger divisions of farm land that they can properly cultivate. They have large areas that are, or should be, devoted exclusively to grass.

We have a market and a climate that is especially adapted to the cultivation of beef, hence, we should under these circumstances go into the production of beef on a marketable basis, always taking into consideration that the cow that is cultivated as beef is turning the crops into a more marketable product, increasing the humus of the soil, and enabling us to utilize what would otherwise be waste products into a profitable part of the farm. In other words the beef cow changes waste areas into a marketable form.

Now, in studying beef production we divide it into two classes: one class produces feeders for the market, the other produces the marketable steer in the more finished form. The reason for this is that the sections of the State that are especially adapted to the production of feeders, do not, as a rule, grow a sufficient amount of crops to turn them into the finished product. Where we have the rough finished lands that are not capable of being plowed to any extent, we can raise our feeders on roughage, largely. On the other hand, where we have land that is too valuable to be turned into pasture, people naturally turn into finishing the beef for market.

We find that in the development of this State, and other stock states, the cattle imported from Europe were of the beef type. They were imported because they were especially adapted to the needs of that time. Later, when the country became more closely settled in Pennsylvania and Ohio and Illinois, the people of Pennsylvania quit raising beef cattle. They went to the Western prairie states for their feeders, and finished them for the market. Later the people of Ohio and Indiana did the same thing, depending on Iowa and Nebraska and other Western states to produce cattle for Pennsylvania and Ohio and Illinois. A little later the Middle West went out of the beef production and it moved onward toward Western Kansas, Montana, Wyoming and the Western Mountain states.

A large percentage of the cattle finished in the corn belt of the United States, are produced west of the Missouri, rather than east of it. At the same time, the demand for feeding cattle is becoming larger in Pennsylvania, Ohio and even as far West as Iowa. Consequently the supply has not kept pace with the demand, while the market price has more than kept pace, so that the feeders of Pennsylvania are not complaining of the price they get for the finished product.

In the spring of the year the market was especially well priced for the finished product. At the same time there was a deficiency in cheap and relatively unfinished cattle, so that cattle that required only two months more feeding to finish them properly, brought twenty-five cents a hundred less than that finished up to the standard. That was about the condition of the market which made all our cattle go into market faster than they could be made; later on in the year there was hardly a time when the finished cattle could not be shipped into the Chicago market at a higher price than ever before. In the Pittsburg market they quoted beef from the blue grass cattle

at eight dollars per hundred advance. The demand therefore is, not only for beef cattle, but for beef cattle of a correct type ready to meet the market demands. It shows the tendency toward the production of beef in our State. Our breeders and our feeders now are beginning to aim their attention to the production of beef cattle in Pennsylvania. I have been in Pennsylvania a little over two years and just now we are receiving more letters in regard to the raising of beef cattle in Pennsylvania in a week than we did during the entire year I was at college. Within the last month one farmer at least, and very likely two, have established the nucleus of a beef herd in Lancaster county, so that the tendency is to produce more beef cattle than ever before.

Now, the question is whether these men will be justified in the change. During the last twenty-five years there has been a tremendous change in the beef market. Take an average of five years periods in the Pittsburg and Chicago markets, we find at the end of each five years that the cattle were worth more, and the demand was larger than during the preceding five years. So that the price of cattle is increasing and at the same time our soils in Pennsylvania, and in the West, are increasing in fertility and the tendency is to put more animals on the farm and put back the fertility, and at the same time use up the roughage. When we pay more attention to the question of soil maintenance, we will have a great many more cattle than we have at the present time. At the College we have now twenty pure bred beef cows that we are trying to handle in the most economical method possible, and see whether it will pay in Pennsylvania to keep a cow for the calf she produces. We are feeding them a ration of corn silage and cottonseed meal—about forty-five to fifty pounds of silage and one pound of cottonseed meal per head daily. Since the first of December they have gained a trifle over a pound a day per head, which shows that they are not only maintaining themselves but are putting more fat on their bodies. Throughout the summer they will be granged without grain, and in the meantime we are feeding two market lots, one of which is given all the cottonseed meal they can eat, without grain, and the other is put on a grain ration with corn silage and cottonseed meal. You will notice we have absolutely discontinued feeding hay to our market cattle this year.

This is not because hay is not good, but in our local market we have hay selling for from twenty-four to twenty-six dollars per ton, while silage is costing us less.

**MR. FENSTERMAKER:** How much less?

**PROF. COCHEL:** We estimate that one of corn is worth three of silage on the market basis.

Last year was a disastrous year for the men who fed beef cattle. We fed five lots at the Station, and we found that not a single one paid for themselves and the feed they consumed, unless we give some value to the manure. The average price we received for our corn in this form was a little over a dollar a bushel, while it cost us sixty cents.

So in making up our minds as to the value of the crops raised on the farm, we should take it through a series of years rather than one year, like last year, when it would show a loss, while the previous year would show a profit, but take an average of five years. In tabulating the published results from the different experiments for the last five years, we find that corn has brought an average of twenty cents per bushel more when fed to beef cattle than when put on the market in its original form. The hay has been credited at its full farm value. So, taking a series of years, we get a more correct return than by taking it for one year only.

During the Livestock Show at Pittsburg, they had a fine display of the beef breeds—Shorthorn, Angus, Hereford, and Galloway, and in them all was noticeable that the uniformity of breed and finish, that is typical of the beef standard, which is bred for the purpose of being slaughtered without much waste.

Now that is what we must expect to produce in Pennsylvania. We can't expect to produce good beef cattle from a scrub cow. We must produce a type of the beef class.

Now, as to what feed. There must be an amount of roughage in proportion to the quantity of grain, alfalfa, hay, corn silage, clover hay. The steers will soon get fat enough to sell to our local butchers, but if we expect to ship to the Central Market and expect to sell at the best market price, we must produce the market type, and feed in the cheapest manner possible. To feed corn at the present market price, is almost certain to result in a loss.

MR. SHOENER: How much corn do you feed, and how long?

PROF. COCHEL: One pound of cottonseed meal and all the silage they would eat for approximately two months. When they begin to put on some fat and we want to get them into a satisfactory condition to sell we give them one and one-half pounds of corn for each hundred pounds they weigh—that is the ear corn, and they you increase in proportion as they increase in weight. A two thousand pound steer would eat approximately twenty pounds of corn. We have no difficulty with the market this year; we can buy corn at any approximately less price than we can buy hay, so we find it advisable to feed corn.

MR. MARTIN: Do you consider it more profitable for the man who wishes to go into the feeding business to breed his cattle or to buy them?

PROF. COCHEL: It will depend entirely upon his ground. If he had rough ground and can produce grass, it will be all right to breed his cattle; but in a section of country where he can produce corn, let him feed them. If he finds it advisable, he can do the two.

MR. MARTIN: In this system of soiling, could clover hay be utilized in breeding?

PROF. COCHEL: If a man had the labor he could do better by going into the dairy business. For instance, at the College we have one man who is weighing out the feed that one hundred cattle consume, and in addition, he attends to about one hundred sheep and



fifty hogs. In the barn we have three men attending to fifty cows. I think you will notice, if you study the dairy business, that the men who make a profit out of the dairy business, are men who have large families, and each member of the family has certain work to do, and they are not given credit for this work. He generally counts that he has only to pay one man a dollar and a half a day and his board. I think you will find, if you study the question, that, as a rule, the man who runs a dairy farm, is a man of family, while the man who has the rough land and breeds cattle is generally a bachelor.

MR. MARTIN: How do you account for that?

PROF. COCHEL: It doesn't require so much work. Dairy men are usually married men, and have large families. Now, carrying it a little further, you will find that the man who runs a truck farm, near a large city, must have a large amount of labor, and he is usually a married man, also with a family to help him. The raising of beef cattle can be done with little labor. The cattle take care of themselves when the man is busy, because they are on grass, and in the winter when the crops are stored in the barn there is where your handling of beef cattle comes in. I think it is largely a question of labor, whether a man wants to raise beef cattle, or go into dairying.

A Member: Could you not cheapen your feed a little if you could raise your own concentrates—say soy beans and have them ground into meal? Would that have a bad effect?

PROF. COCHEL: No, it would not have a bad effect, but it all depends upon whether you could produce something that would be of more value. I would say, however, that if you could raise alfalfa hay, you would get just as good results in feeding, and add more to the value of the hay.

MR. J. ALDUS HERR: Would not alfalfa and silo make a good ration?

PROF. COCHEL: No, not for a beef steer. Ordinarily, for the scrub cattle it would, but there is where your beef cattle goes ahead of the ordinary cattle. You take a dairy cow that is producing fifteen to twenty pounds a day; if you expect her to produce forty to fifty pounds, you must expect to add to her ration, and if you expect to add a large amount of fat on a steer you must feed concentrates. If you are trying to grow a frame, you can feed him almost entirely on roughage.

MR. MARTIN: Do you find that the four different varieties of beef cattle give better results on the same feed than the other kind do?

PROF. COCHEL: Yes, sir; if you study them you will see that the Angus type to almost perfect marks. The Hereford are the best grazers, and the Shorthorns are a little larger than either of the other two breeds, and will dress almost as well, and produce almost as much as the other two.



The SECRETARY: What about the Galloways?

PROF. COCHEL: They are especially adapted to a rough, mountainous country, where they have to hustle a little bit more for their living. Under our Pennsylvania conditions it is not considered very profitable, and it is the one herd of beef cattle that has actually decreased in the last ten years in the United States.

The SECRETARY: Are they better hustlers?

PROF. COCHEL: No; but they seem to be able to stand a little more without injury to their health.

The CHAIRMAN: At what age do you consider it most profitable to fatten your own steer?

PROF. COCHEL: At about fifteen to eighteen months, if you are producing him; if you are buying him from some other section, and feeding him, they are more profitable at two years old, because they have a large frame, on which to build, and they fatten a little more quickly than a younger animal in the same time.

MR. HOLMAN: Soy beans ground takes the place of cottonseed meal?

PROF. COCHEL: Of course.

MR. WEIMER: How long should the milk be given to the calf, if you produce the calf yourself?

PROF. COCHEL: Let a calf suck the cow for six months or even as long as she gives milk. A calf six months old should weigh six hundred pounds, and yet you will see them suckling as lustily as the little fellows.

MR. WEIMER: You practically allow them to wean themselves?

PROF. COCHEL: Yes, sir; when I was at the Indiana Experiment Station, we worked on several experiments. We took six calves weighing approximately three hundred pounds to the Chicago market, they averaged us twenty-five dollars per head, and we sold the lot for seventy dollars.

Now the man raising his own cattle can save about two months in feeding. They should weigh approximately a thousand pounds when they go to the market.

Are there any other questions? I thank you for your attention.

The SECRETARY: I will call the roll again at this time, if any of you know of members who have been here but may not now be in the room, I wish you would answer for them in order that our record of attendance may be correct.

The result of this roll call is included in the record of attendance as given earlier in the journal of the proceedings.

COL. WOODWARD: Are you ready to receive the Report of the Committee on Resolutions at this time, or not?

The CHAIRMAN: What is the pleasure of the Board? There seems to be no objection, so we will let it be heard.

Col. Woodward read the report of the Committee on Resolutions as follows:

## REPORT OF COMMITTEE ON RESOLUTIONS

### RESIDENT HUNTERS' LICENSE.

*Resolved*, That we approve the passage of the bill, known as Senate Bill No. 407, or a similar bill which provides for the exemption of the land owner from the necessity of procuring a Hunter's License.

Provided, also, That any bona-fide owner of lands in this Commonwealth or the bona-fide lessee of lands within the Commonwealth, such person being a citizen of the United States and a resident of this Commonwealth or the child of such owner or lessee, shall, during the open season for game in the Commonwealth, have the right to hunt game upon the lands so owned or leased without securing the license prescribed by this act.

For the purpose of this act the fact that any person shall be found in possession of a gun or mechanical device of any description possessing the power to propel with force a leaden or metal bullet or pellet, either in the fields, in the forest or on the waters of this Commonwealth, shall be considered prima-facie evidence that such person is hunting, and shall render him liable to display his "Resident Hunters' License" upon demand made by any officer of this Commonwealth whose duty it is to protect the game and wild birds of the Commonwealth, or upon demand made by any owner of lands or the bona-fide lessee of lands within this Commonwealth, or upon demand made by any employe or representative of the before-named owner or lessee upon whose lands such person may be found hunting, and for failure to comply with such request, such person so neglecting or refusing to display his "Resident Hunters' License" shall, upon conviction, be liable to a penalty of twenty dollars; and the fact that any person may be found upon the highways of the Commonwealth in possession of a gun and the dead body of any bird or animal classed as "wild" in this Commonwealth, shall be considered prima-facie evidence that such person is hunting, and such person shall, upon demand made by any officer of the Commonwealth whose duty it is to protect the wild birds or game of the State, be required to display his "Resident Hunters' License," and for refusing to do so shall, upon conviction, be liable to a penalty of twenty dollars; Provided, That all penalties collected for violation of any of the provisions of this section shall belong to the Commonwealth.

The CHAIRMAN: You have heard the reading of this resolution, what is your pleasure?

MR. DeWITT: I move it be adopted as read.

This motion was properly seconded and duly carried in the regular way, with one dissenting vote, that of Mr. Hutchison, who desired that it be so recorded.

Col. Woodward read the second resolution as follows:

## NEW FERTILIZER LAW

*Be it resolved*, By the State Board of Agriculture, in session at Harrisburg, Pennsylvania, this 25th day of January, 1912, as follows:

That we earnestly recommend to our next Legislature such legislation as will give the purchaser of commercial fertilizers positive knowledge of the source or sources of the nitrogen, phosphoric acid and potash contained in said fertilizer, by requiring the manufacturers to make specific statements of such source or sources on each package placed on the market.

*Resolved further*, That refusal to comply with the statute after enactment or labeling a package fraudulently should be made punishable upon conviction by suitable fine and disbarment of any brand so marked, or any other brand of same plant food content by such convicted company, from sale in this Commonwealth.

I move you as Chairman, that this be adopted.

This motion was properly seconded.

MR. HUTCHISON: Three years ago, we had a similar bill before the Legislature, and the manufacturers of fertilizers from all over the country attacked the bill and made a strenuous fight against being required to state the sources of their supply of nitrogen and phosphoric acid, and they defeated the bill. It means a good square fight, if you want to bring this before the Legislature again, and if you want to endorse this resolution, you can use all your influence with the members of the Legislature.

The SECRETARY: I was not present at the time this bill was up, but I kept in touch with it. I understand the argument they put up was, that it was almost impossible to tell where they obtained it even if they felt so inclined.

MR. HUTCHISON: They contended that it would compel them to have two sets of fertilizer sacks, and that was what convinced the Committee in the Senate. It is worth while to try again, though, and if it is your pleasure, we will use our best efforts to carry out your instructions. We made a strong and hard fight the last time, and we are willing to try it again.

MR. SHOEMAKER: What would be the penalty provided for violation?

MR. HUTCHISON: In the bill as it stands a fine of from twenty-five to one hundred dollars for the first offence, and two hundred dollars for the second. This calls for the disbarment from the State. We prosecuted quite a number of cases this year and in all of them we were successful.

MR. FENSTERMAKER: If I am correctly informed, there are states that have exactly the information that we want. Cannot the Secretary get this information that we need? If it can be done in other states, why can't it be done in Pennsylvania?



MR. HUTCHISON: We have prosecuted and have convicted them in every case.

MR. FENSTERMAKER: I mean the new law, as outlined to us. I have heard the states mentioned, but have forgotten them.

The SECRETARY: Mr. Fenstermaker is right, and if this argument is brought up again, we will see what can be done with them in other states.

COL. WOODWARD: There are farmers who are compelled to pay high prices for cheap fertilizer. We ought to protect our farmers in this matter.

At this point the Chairman called for the vote and the result showed the unanimous adoption of the resolution.

Col. Woodward read resolution number three, as follows:

#### CHESTNUT TREE BLIGHT

*Whereas*, A destructive fungous disease known as the "chestnut tree blight" has appeared in many counties of Pennsylvania, causing a serious loss to timber owners and taxpayers; and

*Whereas*, The blight threatens the entire destruction of this valuable native species of tree in Pennsylvania and adjoining States, if not checked and eradicated.

*Therefore, be it resolved*, That the Pennsylvania State Board of Agriculture hereby pledge its earnest and active co-operation with the Pennsylvania Chestnut Tree Blight Commission in the efforts of that Commission to control and eradicate this new enemy of our forests, recommending that each member of this Board assist as far as practicable in promoting public interest in the subject, that the work of the Commission may be advanced as rapidly as possible throughout the affected areas of the Commonwealth.

*Be it further resolved*, That the bill introduced into Congress, appropriating \$80,000 for the use of the U. S. Department of Agriculture in similar work in the various states where the chestnut tree bark disease has appeared, is recognized as a worthy and deserving measure, and the Pennsylvania delegation in Congress is respectfully urged to give it their united support.

As Chairman of this Committee, I move the adoption of this resolution.

This motion was properly seconded and duly carried in the regular way.

The SECRETARY: I move the adoption of the report as a whole.

This motion was properly seconded and duly carried in the regular way.

The SECRETARY: Now, Mr. Chairman, it is understood that this Committee is to remain as a Standing Committee on Resolutions, and make their report at the next meeting.



MR. SNAVELY: That is the sense of the Executive Committee.

COL. WOODWARD: I'm asking for information. Is this Committee expected to devise resolutions or simply to consider them, as they did this afternoon?

The SECRETARY: My own thought is that they are to perform the duties performed by Committees on Resolutions generally; they are a deliberate body and they can devise resolutions, and also consider those offered by others.

COL. WOODWARD: What do I understand the Secretary to mean by the "next meeting?"

The SECRETARY: By the "next meeting," I mean the next Annual Meeting.

MR. HUTCHISON: I learn with a great feeling of sorrow this afternoon, that a call has come from the State of Kansas for the services of Prof. Cochel. He is doing a great work in Pennsylvania along the line of developing the beef cattle industry, and I think it would be in order for our Board to pass a Resolution commending his work, and trying to keep him here.

Now that he is developing an interest in the livestock industry, it would be a serious loss to the farmers of Pennsylvania to have him go away. It takes a man some time to get into touch with it. He has gone up and down the State and has made the acquaintance of our farmers, and received their confidence, and I would, therefore suggest that we take some action in the matter.

MR. MARTIN: Mr. Chairman, if I have the privilege of the floor, I would say that the livestock industry of Pennsylvania would meet with a loss that could not, in many years, be repaired, in the taking away of Prof. Cochel, and I would suggest that this meeting offer a vote of thanks to Prof. Cochel for the good work he is doing, the influence of which will be felt for at least a decade to come.

COL. WOODWARD: Gentlemen, I am ready to accept the motion of Mr. Hutchison, and also to second that of Mr. Martin.

This motion was duly carried in the regular way.

PROF. COCHEL: Mr. Chairman, I suppose I should remain entirely in the background, but after such a vote of approval I want to express my appreciation of your acknowledgment of my work in Pennsylvania. It may be that conditions are such in Kansas that I will be glad to stay here, but there it one thing I want to say and that is, that unless the support of the College is much better than it has been in the past, it would hardly pay a fellow to stay there. We are treated with the utmost courtesy, but we are working under a handicap, and it is simply a question of opportunity.

I thank you very much for your appreciation.

The CHAIRMAN: Now, if there is nothing else, I will just call your attention to the fact that there is a good program for this evening. We will have the reports of Dr. Harvey, and some of the others.

If there is nothing further, a motion to adjourn will be in order.

COL. WOODWARD: I move that the Secretary of the Board be requested to submit a copy of Mr. Hutchison's resolution to the next Legislature when it meets.

MR. HUTCHISON: I think it would be well for the Secretary to communicate with the Trustees of the College, and also with the Faculty in the matter.

COL. WOODWARD: I withdraw my resolution.

The SECRETARY: The Secretary will be very glad to have a copy of the resolution sent to the various communities, and also to the next Legislature.

MR. FENSTERMAKER: I see no reason for withdrawing it, if we pass it, it may do some good.

COL. WOODWARD: The resolution commending Prof. Cochel has been passed; I withdraw my resolution, because it would emphasize the statement of Mr. Cochel in reference to the support of the College.

MR. STOUT: The boxes containing the different varieties of soil specimens, will be left here between the sessions this afternoon. If any of the gentlemen wish to see them, you can probably do so better by day than after dark. They will probably be taken away after this meeting.

MR. JOEL A. HERR: I move we adjourn until 7.30 this evening.

This motion was properly seconded and duly carried in the regular way.

Adjourned until 7.30 P. M.

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Harrisburg, Pa., January 25, 1912. 7.30 P. M.

Mr. Seamans in the Chair.

The CHAIRMAN: The meeting will please come to order. The first number on the program is the report of the Economic Geologist, by Dr. Isaac A. Harvey, of Lock Haven, Pa.

Dr. Harvey's report was as follows:

## REPORT OF THE ECONOMIC GEOLOGIST

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By DR. ISAAC A. HARVEY

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In 1906, having noted in the newspapers some discussion and controversy relative to the coal supply in the United States, I shortly wrote to the Philadelphia Press an estimate of the entire amount of coal in the several states of the Union, based on the latest reports of the National Geological Survey, and such additional data as I had acquired from other sources.

The estimate of the entire area of coal in the United States as published prior to 1906 was 270,000 square miles, and I ventured to increase the same to 450,000 or 500,000 square miles by adding a reasonable per cent. to the figures in the several states and territories, so that my final figures of the amount of coal were about three trillion tons, which at the present rate of production and consumption and with allowances for a certain increase in demand, proportionate to the years past, would last as long as the world has been in existence according to the Mosaic records.

Some time last year, Mr. Carpenter, the noted reporter and correspondent of the Philadelphia Press interviewed Prof. Smith, now Director of the United States Survey, and derived from him a computation or general view of the coal in the United States and similar to my own figures as sent to the Press. His calculation was the same in substance as mine and intimated that the body of coal in the United States might last as long as the world has stood. I admit that such a computation seems fabulous and unreal, but as the several coal seams in forty or more of our counties in this State, if laid flat as one workable seam, would more than cover the entire State; so, also the various coal areas in the United States, if arranged in the same position and as one good workable seam of four feet or more in thickness, would very much more than cover or equal the area of the entire nation and all its dependencies.

Going to Arizona and Sonora, Mexico, in 1889, for Mr. Dodge, of New York, I made some examinations for copper and coal and with the data so obtained ventured the prediction, that, within a generation, Arizona would exceed Michigan in its product of copper, being mostly found in low grade ores and yielding variously from five to ten per cent. of this metal. This result has been realized as the records show. Prior to this trip, the coal in Arizona was considered an unknown quantity and no figures had ever been given by the United States Survey, the several efforts at local development on the Apache Reservation, and incidentally elsewhere, failing to afford any encouragement of workable deposits or any satisfactory guarantee that Arizona would ever show any available basins for coal operations or production that would justify development or mining.



I saw enough of the deposits in Arizona and Senora to persuade me to believe, or at least hope, that Arizona would ultimately yield her proportion of the carboniferous products in the shape and quality of good coal of several kinds to place her in the list of the coal producing states. Within the last three years, or about eighteen years after my hurried exploration down there, the assistants of the United States Survey secured some accurate information and reliable figures, whereupon they have announced, with the approval of the Director, that Arizona contains as much available coal as the entire amount thus far mined and used in the whole country, and, of course, this means many billion tons.

Thus, while the actual epochs or periods in which coal may "exist" have been ascertained to a certainty and geologists have proved the limit of the rocks that contain coal, yet the defective estimates of acreage and extent is due to the superficial and hurried manner in which the coal fields are in the first instance examined; and, thereby, the actual extent of the coal bearing rocks not demonstrated or determined in a given field, locality or state; and, as a result, the maps and reports very much circumscribe the coal basins, and exclude from the estimates and surveys much of their area that otherwise and by careful investigation would be contained in the figures that report the same.

In after years, a revision of these reports and a more careful and thorough development show a very marked increase from the original figures and estimates, both of quantity and area. This applies to every state that contains coal, and in which the tendency to submit a conservative report has so often warped the judgment and furnished a minimum computation with reference thereto.

Thus, in my report to you two years ago, I estimated from ninety to one hundred billion tons of coal in this State; so that my prior figures in a venture to estimate the amount in the United States assumed that our State contains about one-thirty-fifth of the entire quantity of coal in the United States. The length of time that this amount would supply the people, (varying figures having been suggested by prominent geologists,) depends, of course, upon the increasing demand, the economical and careful mining, with the probable discovery of devices or methods whereby the coal waste will be reduced to a minimum, its by-products utilized and the entire body of heat produced be controlled and husbanded with the least possible loss.

Again, what skill and invention may do to accomplish some of the needs now depending on coal and thereby reducing the demand, or at least restraining the demand, no one can conjecture; and that it may be many centuries, perhaps some thousands of years may elapse, before the Nation shall experience a coal famine; and what may be provided as a part substitute for coal ere such a calamity may ensue, no one can venture to surmise, "for the thoughts of men are widened with the process of the suns." Genius is limitless in its conceptions and possibilities towards contrivance and invention. Another feature of the utility of coal and its value to the consumer is that while analysis will determine exactly its elements and its amount of combustible matter, yet its chemical composition does not always indicate the real or comparative fuel efficiency which oftentimes seems



more valuable by reason of its structure than its chemical composition. Thus the product of a certain coal seam may contain fuel matter (condensed carbon and volatile matters) to the amount of 90 or 95 per cent. and comparatively very pure but so soft and friable that it crumbles or disintegrates very readily and its use is very much reduced by waste through the grate bars under the boilers of locomotives or stationary engines; and instead of complete combustion and reduction to ashes, a very considerable per cent. is never consumed, thus impairing its fuel efficiency when compared with other coal which may show the same analysis, but being compact, hard, and as some call it,—lumpy, will have a decided advantage over the softer coal in the production of steam or even for domestic use.

So, also, I have seen along certain railroads immense quantities of coal half consumed and mixed with imperfect coke, the product of the locomotive fires and dumped from the ash pan; so that people living along the line find it convenient to use these ashes for fuel in their households. I have stated these facts many times to the superintendents of railroads, and also in my reports on coal properties. I know instances where coal from a certain seam, notably the A., and containing 85 to 88 per cent. of fuel, rendered better service by actual test and use than certain other coal that analyzed 92 or 93 per cent. of fuel matter; the difference in efficiency being due to the compact and solid structure of the inferior coal, chemically, when compared with fragile, friable and crumbling structure of the other.

Hence, do not conclude that the coal that shows a lower per cent. of fuel matter is serviceably less valuable or efficient than coal containing the higher per cent. of fuel matter, unless both are of similar structure. It is the units of heat that are required and the actual production of steam that will determine the value of the coal to the consumer. Bear this in mind, and while having due regard for analyses and chemical purity, also consider the structure, and friable also, that the harder coal, upon the bituminous basis having an equal amount of fuel with the softer coal, will be found invariably to be of more utility.

It is a subject of much concern how we shall be able to supply the increasing demand for iron ore, not only in this State, but elsewhere. Much of the ores now used in Pennsylvania are imported from other states, from Cuba and elsewhere on this continent and consist largely of red hematite or steel ore, so called, from Michigan, Wisconsin and along Lake Superior; the product of metallic iron, being almost invariably 65 to 68 per cent. and in some exceptional instance 70 per cent. In our State and elsewhere are some important deposits of magnetic ore, magnetite and sometimes nearly or quite as high in metal; but often yielding as low as 35 to 40 per cent. The red hematites having singular value by reason of their being readily converted into steel without the basic process; that is lining the converter with an alkali preparation,—and hence producing the steel at considerable less cost. With the exhaustion of steel ore, red hematite and, in fact, the magnetic ores, we will have remaining certain veins or deposits of brown hematite associated with our lime stones, and, notably, the lower silurian rocks, with incidentally, the

same ores in the Clinton shales, Catskill, etc., and the gray carbonate ores of the coal measures and sub-carboniferous rocks producing from 20 to 50 or 55 per cent. of metallic iron. These are sometimes used in the production of pig metal, and, especially, where convenient for mining and transportation, but are not deemed valuable in comparison with the richer steel ores, magnetites, etc., that are imported as described.

Again, there are extensive deposits of red shale with their associated rocks that contain from 15 to 25 per cent. metallic iron; and an urgent question is today, or will be ere many years will elapse, how shall we utilize these low grade rocks, and by what process make them valuable for iron and steel products with reasonable cost? There are chemists experimenting towards a solution of this question, and I have seen some favorable and encouraging, if not complete, deductions in this direction; in one instance, a Southern gentleman having demonstrated to a Wall Street Company, engaged somewhat in promoting such various devices and inventions, that it is possible to reduce such low grade or lean ores by a chemical or electro chemical process, whereby the ores containing as low as 6 or 8 per cent. of metal, can certainly be made useful and at a nominal cost, so far as the process is concerned. Whether these samples, as shown to me, were typical of the results of the process if applied to a large amount of ore, I cannot say, but the results seemed promising to me and others who examined them. This threatened iron ore depletion or exhaustion naturally evokes the question, who will in a sensible and reasonable measure find a substitute for the rapid exhaustion of iron ore; and aluminum has been suggested by virtue of its lightness, toughness and flexibility; so that if its production may be realized at a reasonable cost, the disappearance of iron ore will not create the dismay that is now so ominous, and the process is yet to be discovered whereby the almost limitless clay deposits, with their 15 to 25 per cent. of alumina (oxide of aluminum) may respond to the query as to what will replace iron, and how meet the demand, for iron products or something that will be quite as useful and available, without hardship, when iron ores of the better grade have disappeared.

Again, we must resort finally to chemistry or electricity or both, and who shall put a period to the word electricity, in contemplation of its innumerable devices and the domain that it affords for the exerting of man's skill and almost supernal conceptions and ingenuity. The seemingly impossible solution of many problems of perplexing effort and unusual exertion will be found year after year in the application of electricity or electro chemistry and its wondrous and almost divine devices, phases and potency. While delivering a former report to this honorable body, I referred in a digressive way to the problem of good roads and very briefly suggested a line of experiment that might contribute to the solution of this momentous subject.

Nature has given us pertinent lessons whereby we may clearly experiment and duly acquire some definite ideas towards the making of roads that will not so shortly vanish away in dust along the country thoroughfares, lanes and by-ways, cared for in part by the old time supervisor. We notice the exposures of slate and shale, red, black

and gray, containing from eight or ten to twenty-five or even thirty per cent. of alumina which is the binding or cementing ingredient of all clays used for the making of fire brick and building brick and other clay products, and we often see the roads as smooth and compact as any that can be constructed with limestone and sandstone and less liable to become disfigured if I may use the term, and unsightly by the impact of wagons, autos, etc., which so soon wear out and destroy artificial roads. Is there not a combination of silica, alumina and lime contained in sandstone, limestone and shale, in proper proportion, that will produce a solid and compact road bed, more permanent and lasting, and yet more acceptable to the traveling public, than any road made simply with sandstone and limestone without the aluminum? I think so. In a tentative way, why not test these elements by repeated experiments, using say, from one-third to one-half of clay or clay shale containing, as it does, from fifteen to thirty per cent. of alumina and from fifty to seventy of silica, with a small ingredient added thereto of limestone, and changing the proportions of these several elements time and again, and applying to certain "stretches" of road until the best results are obtained. I mean to say, briefly, that this element of alumina, as found in clay, or shale added to the application of limestone and sandstone or sandstone alone, is rational in theory. Alumina in proper per cent. will make an admirable addition to the road bed, avert very appreciably the wearing away of the road and prevent measurably the dust arising from sandstone and limestone roads. Give this your consideration and notice what nature has suggested.

Aluminum makes the road smooth and level and if not so hard and compact as limestone and sandstone, yet being somewhat flexible or slightly plastic is certainly more to be desired as a component with limestone or sandstone or both than the two latter elements could be without aluminum. In short, shale and slate make a better road than limestone and sandstone, by reason of the presence of a certain per cent. of aluminum which has been almost disregarded in road making. A bastard limestone, which is a native cement rock, would be better adapted to the construction of roads than a pure limestone would be, since it contains a small per cent. of alumina.

Three years ago, I made a few remarks relative to the game and fish laws, with a special reference to deer and trout, and upon the request and insistence of scores of men representing hundreds or thousands of others who enjoy fishing and hunting, I am constrained to make some further comments on the subject.

The almost universal opinion among trout fishers, with very rare exceptions, is that the number of trout that may be caught should be prescribed by law, and not the length thereof, and no one with experience in fishing the trout streams, can deny that three-fourths or more of the small trout, being less than six inches, die after being caught and thrown back into the stream, and thus the streams are largely depleted of the same. I am sure that instances have become very frequent where the fisher has actually hooked two hundred or three hundred small trout before getting what is termed the limit of fifty trout, as allowed by the statute. I tried a stream several years ago and caught nine trout of less than six inches in length, and throwing them back, noticed that most of them turned on their sides



and probably died. The acceptance of the opinions of thousands of men who know these facts by experience would be wise and expedient in framing these laws. In our county (Clinton), 161 bucks were killed last season and the number of hunters was six or seven hundred, estimated, or a hunter for every thousand acres of the area of the county. In 1910, the number killed was 140, and the excess of last year's sport due, not to the fact that there were more bucks in the county, but to the tracking snow that continued almost through the entire fifteen days of the season; and the season of 1910 was not so favored, and had the smaller number of deer slain. I have talked with scores of hunters, probably with hundreds, and know the trend of opinion of all classes of men who seek sport of this kind in the woods, and nineteen out of twenty are positive in the opinion that the most wise, just and effective law would provide for the killing of one deer by each hunter, regardless of the sex thereof, leaving the hunter to secure either a buck or doe as the opportunity afforded. This view I have derived from hundreds of men and ranging from twenty to seventy-five or eighty years of age. Moreover, it does not seem to them that the section that requires a hunter to see the horns before shooting at a deer is in any sense, or leastwise only in a limited way, a protection to the life of those who are in the woods in the hunting season, but that the many sad accidents were formerly due to carelessness and to the excitable state of mind of certain persons who lack self-control and nerve; and that later the hunters have learned to be more upon their guard and self-restraint and wear caps or clothing that will at once distinguish them from deer or other animals. Sad experience has taught more care and forethought, so that accidents or shooting into the bush at some indefinable object are almost certainly averted, simply by the schooling that has been experienced. Any man that would shoot an indistinct object in the bush upon a nervous impulse would not be so deliberate in any emergency, as to look first whether it has horns or not, and such persons should be barred from hunting under any and all circumstances. Three years ago I noticed some bear tracks in the snow in a remote part of West Keating township, in my own county, and as a bear had been shot a few days before, within a short distance of these tracks, by hunters to whom I showed his "signs," in the snow and near a spring, I got a Winchester from one of my men, then prospecting in that locality, and standing in a small natural clearing where many tracks appeared, I noticed, just beyond, the brush shaken by some object moving therein, and with a slight nervous tremor, but a self imposed injunction to "hold on quaker" and be cool, I waited for the object to appear in the clearing with a determination to kill a bear; but, very soon one of my men with dinner pail in hand and returning to camp half an hour early emerged from the brush. I didn't shoot but severely rebuked him for not being a bear. Now, what would have been the result if I had fired into the oak brush two or three times? Probably, I would have killed a man for whom I had a very kindly friendship. Moreover, the theory that the present law is effective towards the preservation and increase or propagation of deer is erroneous as avowed by all the hunters, with one or two exceptions, with whom I have conversed on this subject; inasmuch as all claim and affirm most posi-



tively, that there are very few fawns now in the woods and very many barren does, which as they say is due to the destruction of the bucks; further, that each buck has its mate for a period of many months and rarely seeks other does; and ordinarily, will not go any very great distance to consort with other does after it has found a mate. I have noticed many deer tracks in the snow in hunting sections after the season closes and through December, January and February, and there was a most woeful absence of buck tracks, which are readily distinguished from the doe tracks.

Now, the question has arisen, what limit there will be to the killing of bucks and will the time arrive when these animals will be entirely exterminated, barren does in numbers probably left to die of old age, or be killed by the wanton hunter; and finally, all tracks and traces of deer become obliterated. I cannot conceive that the well spun theory, intelligently formulated and the laws therefrom enacted can avail with the same desired results for the promulgation of deer and the prolonging of the hunters enjoyment, as any law or section thereof based upon the actual experience and consensus of men of all classes and grade of intelligence and many nearly of the same or equal stamina or discretion with the members of the assembly who frame the laws in this respect. Is it not true, that the country members supposedly informed upon this subject, do not participate in the preparation of these laws upon the idea of equality with the city members, who to the number of forty, fifty or sixty, very largely control the legislation in this and other directions, in a sense, excluding the knowledge, wisdom and experience of the country members who may only have been in the Assembly, at most, a term or two. An old hunter remarked that "these hunting and fishing laws are made by men down at Harrisburg who don't understand the human nature of the deer and trout, as well as us fellows that live in or near the woods." Kindly bear in mind, that I have no strictures or criticism for the Game and Fish Commission, or upon its worthy and efficient Secretary, Dr. Kalbfus, since they and he are effectively enforcing the laws; but being compelled and urged by so many men whom I know to be wise in these things, I could not refuse to refer to the matter, and have been many times assured that the brief suggestions in my former report were read and widely approved by the men who enjoy hunting and fishing and are anxious for a continuance of these sports.

A majority of the counties represented in this meeting contain wide areas of forest and woodland where trout and deer and other game should abound and afford good sport, but from the thousands of acres of nearly primitive woodland in some of these counties both trout and deer have nearly or entirely disappeared.

The CHAIRMAN: You have heard the reading of this very able paper; what is your pleasure?

The SECRETARY: I move it be received and printed in the journal of the proceedings.

This motion was properly seconded and duly carried in the regular way.

The CHAIRMAN: Next in order is the Report of the Agricultural Geologist, by W. H. Stout, of Pinegrove.

Mr. Stout's report is as follows:

## AGRICULTURAL GEOLOGY

By W. H. STOUT, *Agricultural Geologist*

### SOIL

Soil is defined as the upper stratum of the earth, the mold or that compound substance which furnishes nutriment to plants, or which is particularly adapted to support and nourish them.

There is much concern of late regarding our natural resources and their preservation. Forests, streams and minerals appear to be considered the most valuable from a business point of view, and while all are essential to civilization as necessities, they are only secondary in importance to the human race.

The soil is our most precious inheritance, deserving more care and consideration than is commonly bestowed upon it. It has taken ages of time and ceaseless work of natural forces, physical and chemical, to create the first few feet of arable soil, that is of any value in the art of Agriculture. It is comparatively only a short time since the country was settled by the white race, yet soil depletion to the point of exhaustion is evident where the early settlers first located.

Waste and destruction follow in the wake of civilization. Before the advent of the Europeans, the demand upon soil resources was limited. The tribes then in possession lived a primitive life upon natural resources of game, fish, fruit and vegetables, with a little corn and beans cultivated, along with some tobacco, in a limited way in some localities.

There are periods in the history of every country when agriculture becomes more urgent, and this country has arrived at, or is approaching a time when the supply of food products will not be sufficient to maintain an increasing population.

This is, however, not a matter of immediate concern but the admonition is timely, with the knowledge that poverty, ignorance and superstition follow the decline of prosperity, which is ever measured by the abundance of soil products, and such products are contingent upon the fertility and texture of the soil.

Some of the one-time most productive and wealthy countries known in history, where art, science, education and religion had their birth-places, have lost their identity and are divided among and are under the dominion of German, British, French and American rule. China is the only extensive territory that has maintained its independent existence for a long period. There is, however, much poverty and suffering in that empire, where thousands of the inhabitants are starving at times, and the revolution now in progress is attributed to the suffering of the laboring class.

The Chinese have lived a long time upon the products of the country, consuming at home what was produced, and caring religiously for all wastes and fertilizers available. Subsisting upon a plain and meagre diet that does not appeal to Europeans, the Chinese cultivate their land in small tracts with hand tools, and live or exist with great economy. They have not depleted their soils by exporting grain and other products that contain fertilizing elements that impoverish the land, and as a result they were able to maintain an existence as a nation longer than any other.

It appears that since the world civilizers have gained a foothold in the ancient empire, their troubles have increased and multiplied in proportion as modern methods of business, transportation, education and civilization has progressed. (Under the convincing power of gold, thirteen-inch Mausers and gatling guns, and the benign influence of promoters from New York, London, Paris and Berlin have succeeded in converting the heathens to worship the Golden Calf, adopt civilized costumes and cut off their hair).

The primitive methods, the scrupulous care and economy necessary to maintain a bare existence does not appeal to our race, and that the poor of this country may be forced to adopt in the future similar methods is not a pleasant prospect to anticipate. Instead of preserving their fertility at home like the Chinese, the farmers of this country as soon as land could be made available to produce crops for export, commenced sending them abroad in increasing quantities, often without any profit and often at a positive loss. We take pride and boast of great wealth in our rich lands and the ability to supply other countries with all sorts of farm products. It did not occur to our people that every bushel of grain, every pound of meat, cheese and other products carry away fertility that is absolutely lost to our soil.

From the statistics we learn that during fifty-five years to 1910, the farmers produced twenty-two billion bushels of wheat, of which five and a half billion were exported as grain and flour. Calculating the fertility loss at four cents a bushel, it amounts to two hundred and ten million dollars. The remainder of the twenty-two billion bushels (four times as much as was exported) was consumed in the country and also lost, except what was fed to stock. Thus we lost upwards of eight hundred million dollars in fertility on the wheat crop alone, and much more adding other grains, animal products, cotton, etc., makes a sum almost startling in the amount.

We are robbing posterity of their share of Nature's provisions for existence, in exhausting the soil fertility accumulated during ages since the Tertiary period and the beginning of the Quaternary, when the climate became favorable for the support of vegetable and animal life.

Notwithstanding the industry of American farmers in robbing the soil to produce crops for use and export from this country, according to an expert in international finance, our debt to foreign countries is \$6,575,000,000. We exchange for our soil products the essentials for existence, the products of other climes, that add nothing to our resources excepting the potash and nitrate imported. We import silk, wool, coffee, cocoa, wines, hemp, flax, hops, molasses, sugar, dates, figs, raisins, oranges, olive oil, camphor, rubber, jewels,



diamonds and various other articles for the millions in value of our soil resources. This generation seems dissatisfied with the waste and destruction wrought by its inhabitants but invite all nations to our feast of abundance to aid in its more rapid exhaustion.

These are conditions facing this country, just being realized by thoughtful persons, and how to increase crops at reduced cost is the serious consideration of consumers. This is the one industry that is urged and encouraged to produce excessive supplies regardless of cost or the price. Other industries are not operated on this plan.

Returning to the text the "Soil," there is much to consider. Soil making is in constant progress. Rain, heat and frost acts as disintegrating forces liberating particles from the solid rocks, which form the basis for soils of various degrees of texture according to the nature of the rock from which the material is derived. There are various chemical elements in the rock formations, some of which are essential to plant life to a small extent like lime, iron, magnesia, potash, soda, phosphoric acid and nitrogen, in addition to silica the most abundant of soil constituents.

There is probably no state having a greater variety of soils than the old Keystone, and certainly no better farmers. The folding of the rocks east of Allegheny mountains brings to view thirteen geological divisions and many strata. The Delaware, Lehigh, Schuylkill, Susquehanna and minor water courses cut squarely across the anthracite coal basin, with the Pottsville Conglomerate, Mauch Chunk Red, Pocono Sandstone, Catskill, Chemung, and others of the Devonian System, followed by the Silurian, New Red sandstone, granite and traps.

There is little uniformity of soil until the Silurian south of the Blue mountain is reached, where the Hudson River, Utica shale and limestone valleys spread over considerable areas. The New Red, the latest formation, extends over various counties mixed with the traps from Reading to Philadelphia. Some sections in Northampton, Monroe, Carbon, Luzerne, Columbia, Montour, Northumberland and Lycoming are partly covered with glacial drift and the edge of the Moraine, with its boulders, sand and clay of various degrees of agricultural value.

In the glaciated district, the old lake bottoms and swamps are very fertile where drainage can be effected and on the elevations the soil is generally productive, excelling all others for fine fruit of best quality, Spy, Baldwin, King and Greening apples grow to perfection, and other fruits are successfully produced. The great potato districts in Maine, New York, Michigan and Wisconsin are on drift soil, an ideal condition of soil and climate for potatoes.

Northwest and west, the same conditions exist in Tioga, Potter, Warren, Crawford, Venango, Butler, Lawrence and Beaver counties where the soil is more uniform, resting on horizontal rocks of the bituminous coal, with the mountain limestone.

The anthracite coal field contains no soil of value excepting where the Mauch Chunk red appears in valleys, like the Conyngham, Catawissa, Lykens and Quakake. The various red soils, Mauch Chunk, Catskill, Clinton and Mesozoic or New Red produce fair to very good soil according to depth and texture.



The Devonian and part of the Silurian systems between the first (Blue) and second mountain has some narrow strips of good soil, but is quite various on account of the many strata standing on edge coming to the surface composed largely of shale. The soil on hills is commonly shallow and leachy while the bottoms consist of a cold wet clay soil derived from the clay shale deposited on an impervious rock bed. In some counties, the Lower Helderberg limestone forms good soil of considerable extent, and is useful on the shale and clays, especially so on clay bottoms on account of its mechanical effect in granulating the finely divided particles.

Besides the use of lime to change clay soil to make it more friable, lime may have a chemical effect, to free potash and phosphoric acid from soil combinations and correct acidity. Sand and clay are the principal constituents of all soils and, if in proper proportion, give it texture, and when vegetable material is mixed with it forms mold.

Mixing soils is quite practical, but with present conditions also unprofitable, considering the value of good lands. An acre of soil to a depth of nine inches weighs about two thousand tons, so it would be necessary to move a thousand tons to spread four and a half inches of either clay or sand for mixing. At a very low calculation of twenty-five cents a ton for handling it would cost \$250.00 to prepare an acre which is more than the average value of good Pennsylvania soil.

The soil samples presented here are only a few of the many existing over much of the State. All soils are derived from two sources; Igneous or Volcanic and Aqueous, deposited by water. From these are derived the great variety, changed by the every active elements: wind, rain, snow, heat and cold.

The igneous being the first formed rocks over the surface of the earth, all the others are necessarily derived from that source, through disintegration and transportation by water, ice, gravity and volcanic activity. All elements from which soils are formed were once a general mass of unorganized material.

The various minerals are all derived from the oceans, excepting coal and graphite which obtained their carbon from the atmosphere. The substances useful in agriculture, aside from the rocks, are deposits like salt, potash, phosphates and lime which accumulated from previous existing forms, and held in solution in water.

The Dead Sea and Great Salt Lakes are examples of the condensation going on and the salt mines and brines from which salt is condensed are evidences of rock formations having been deposited at later periods, which covered the saline deposits. The other elements useful in agriculture are derived from the same sources.

All soils contain certain fixed substances in varying proportions and are fertile so long as certain elementary substances exist in a soluble form. Whenever the time arrives through continued cropping that a soil is depleted of the soluble elements accumulated during past periods regardless of its origin, it will no longer produce remunerative crops.

Its restoration and maintenance then becomes a problem of economics of vast importance. Some soils like those of igneous and organic origin, possess inherent substances in larger quantity and a more soluble form than most of the sedimentary of clay and sand

Numerous chemical analyses of soil from various sections prove that the same formation differ widely. The igneous granites and traps from Bucks, Montgomery, Lehigh and Philadelphia counties have a large per cent. of potash and soda varying from four (4) to thirteen (13) per cent. Lime, magnesia, iron, silica acid, alumina is contained in various proportions. A sample Mesozoic (New Red) from Bucks county contained three per cent. potash, a little lime, two and a quarter per cent. iron, seven and a quarter per cent. alumina, a small quantity of phosphoric acid, eighty-four per cent. silica.

The restoration of exhausted soils to a productive condition is expensive. Notwithstanding the abundance of the plant elements found by analysis in soils, crops can not be successfully produced without given quantities of soluble materials.

Chemistry is of invaluable service in many lines of human endeavor including agriculture. The farmer has, however, a wider field for experiment than the chemist in his laboratory confined to a limited space with his acids and crucibles. The farmer has for his domain the mountains, hills and valleys, proclaiming in unmistakable language the fertility or sterility of the soil. Poverty grass and cinque-foil, huckleberry and hogberry, scrub oaks and alders, laurel and fern, rock oak and red oak, Giant Sequoia and cedars, pine and hemlock, walnut and chestnut, hickory and sycamore, beech, birch, and maple with the many grasses and plants indigenous to the surroundings, constitute in Nature a laboratory more delicate and more refined than the most elaborate equipment in the hand of science.

Supplied with a tract of ground, some seeds and plants, patience and industry, fertilizers of various kinds, the practical farmer can solve the problems of fertility and crop production better than any one else. Plants like animals require a balanced ration; the one nitrogen, phosphoric acid and potash; the other protein, carbohydrates and fats. The business of the farmer is to take the crude material, and through his chemical laboratory on the land change it into the refined products useful to mankind. This appears to be a simple process of transmutation; it is surrounded with many difficulties, contingencies and hard labor, that is so irksome to many persons, retarding the back to the land movement.

Practical farmers are not so much interested in scientific research and theories as in the conditions with which they have to do and how to use what they possess to the best advantage to provide for themselves what is required by them and of them. Soil depletion like the shadow of an eclipse moves westward having reached the 100 degrees west longitude in its progress over the Continent.

We have the assurance that "seedtime and harvest shall not fail," so we may trust to Providence for the future of agriculture; in the meantime preserve the soil and trust to explorers and prospectors to find new stores of potash, nitrogen and phosphoric acid somewhere on the national domain.

While the Government is engaged in preserving natural resources, one of the most valuable elements is wasted; nitrogen in explosives, by firing salutes to thirty-cent Potentates, Embassadors, striplings of Royalty and Kings from the Cannibal Islands, etc., costing hundreds of dollars and the game not worth the powder.

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 N. S. Shaler.

The CHAIRMAN: You have listened to the reading of this interesting paper, what is your pleasure?

MR. DeWITT: I move it be received and recorded with the proceedings of the Board.

This motion was properly seconded and duly carried in the regular way.

The CHAIRMAN: The next subject is the Report on Forests and Forestry, by the Commissioner of Forestry, Robert S. Conklin, of Harrisburg, Pa.

MR. WILLIAMS: Mr. Conklin is not present; but if you care to listen, I can make a brief report for him.

The SECRETARY: We shall be glad to hear from Mr. Williams, who is the Deputy Commissioner of Forestry, and familiar with all the details of the work being done in the Department of Forestry.

Mr. Williams spoke as follows:

## REPORT OF FORESTS AND FORESTRY

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By I. C. WILLIAMS, ESQ., *Deputy Commissioner of Forestry*

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The work of the Department of Forestry may be properly divided into three classes: First, conservation; second, protection, and third, the development of forest resources.

During the year just passed we have added to the area of our forest reserves, 32,714 acres, so that the total area of the forest reserves owned by the Commonwealth, on January 1, of this year, was 966,295 acres. There are now under contract to the Department a sufficient number of acres to bring the area up to a round million, provided we are able to purchase them.



This land was all bought and paid for by appropriations made by the Pennsylvania Legislature, beginning about the year 1898, and consequently covering a period of thirteen years; and the average cost of this land to the State on January 1, 1912, was two dollars and twenty-four cents per acre. As land goes in Pennsylvania, this would seem to be an exceptionally low price, and it is a fact that a large proportion of the acreage purchased is really worth a very great deal more today than two dollars and twenty-four cents; in fact, the value of these reserves to the State today stands about six to seven dollars per acre. To show you, let me cite an instance: An area was bought in 1902, and was then well covered with a fine stand of timber, which the owner thought he could not take out with a profit; consequently he let the State have it for two dollars and fifty cents an acre. There were many trees in the tract as it was—hundreds of them—which were worth more per tree than the price paid per acre. Eight years later, in the year 1910, the gentleman who sold this land to the Department, returned and wished to buy it back at a price more than three times what we paid for it, and he would have been mighty glad if he could have repurchased it at triple the price; but there is no authority of law to sell an acre of this land, consequently we could not sell; and for the further reason that these lands are all too valuable to the State to part with, even if the authority did exist.

Now, as to the care the Department is taking of these lands: There is the pruning and planting, and it is the result of this need that there are today upon the forest reserves forty-six State Foresters, who have received a technical and practical education in the school established and maintained for the purpose of educating foresters. With them there is a corps of helpers of about ninety other men who are known as "Forest Rangers," and all give the State a full return in every direction. First in work. These foresters, with their assistants, the rangers, last year completed over a thousand miles of roads and trails in the reserves—a road sufficiently long to cross the State three times from Philadelphia to Pittsburg. There is no use talking about the value of reserves until you have the means of getting into them. It takes money to develop forests, but you might just as well throw your money away, if you do not propose to follow up purchase with a good road system. Roads are necessary in order that everything may be used at the proper time and that these areas may be properly developed so they may return to the State the very largest value per acre, much more than it is possible to get from them without means of proper access.

The law gives the Department the right to lease valuable minerals found on such lands. The minerals so far found are mostly valuable rock. In one of the counties in 1903, a lease was entered into to run twenty years. To date it has run about eight years. This land cost the Commonwealth two dollars and seventy-five cents per acre, and the protective measures since its acquisition have added a few cents more to the investment. The whole tract leased cost something over one thousand dollars. The royalty derived from the lease to date has more than paid for the original cost of the land, plus the protective expense, figuring interest at 2 per cent., which value the Commonwealth receives on its deposits in bank. It has left a very



considerable margin after paying all the costs, besides its primary value to the State. In addition, we have some twelve more years for the lease to run. Now, that is but a single instance of the profitable development of a piece of land primarily bought for timber.

The Department of Forestry grows young trees upon these lands. For this purpose it has established three large nurseries, and a number of smaller ones which furnish thousands of seedlings each year. These nurseries cover about forty acres. One is located at Mont Alto, Franklin county, one at Greenwood in Huntingdon county, and one at Asaph in Tioga county. Last year the planting of trees in the forest reserves equaled nearly two million young trees. Wherever there is a bare space it is the purpose of the Department to plant it with young trees and protect them in order that they may grow into future good timber. Pennsylvania started out with this point in mind, that forestry is a great economic problem, and involves the economic principle of producing the greatest possible return in the least possible time.

The new School Code, passed last year, provides that the net returns of these forest tracts shall be applied to the public schools of the State. It is not likely that the schools will receive much return in the near future, because most of the land is stripped. The State acquires land only after the lumbermen have stripped it of everything they can remove, and then starts in to re-establish the forest. It is only after the forests have been restored and have become capable of making a return, that a large net profit will be derived. This will take a long time, because it is not possible to grow woods overnight.

To show that the work of the State has some magnitude, last year about a thousand pounds of seed of Coniferous trees (mainly pine) were planted, and about three thousand pounds of broad-leaved tree seeds like the oaks and maples. In all, four thousand pounds of seed in one year put into the ground for raising young trees. This is only a beginning, and the future, I think, will show this work doubled and trebled, unless it is so we will not be able to plant these areas in the short period in which they should be covered.

We still have an old problem with us—a problem that has been such since the days when William Penn first entered the woods,—and that is forest fire. It was formerly thought that fires were a necessity, that dead leaves and dead wood might be destroyed, and this idea was not peculiar to Pennsylvania. The effort of the Department of Forestry has been to teach the people that fires are not necessary; in fact that they are unnecessary and that every fire is a distinctive loss. Progress is being made, and the people are beginning to see that forest fires mean loss, and nothing else. So far as the Department is concerned, it does its utmost to prevent fires on reserve lands, but they will come. You know how easily a forest fire is started under favorable conditions, and how hard it is to convince people that fire will not only destroy roughage but also the forests of the State. Just so long as people will not take a reasonable view, so long we will have fires. When we begin to realize that fires mean loss, we will have fewer of them. This is the result of education. When people do not understand things, they will not

deviate from an established course. When they are made wise, you will find a new response, and generally in the right direction. This has been proved with the reserves in Franklin county. When fires were once one of the most prevalent things, they are now practically unknown.

The Department has been able to do some work in assisting in the eradication of the disease that is destroying chestnut timber. You have heard something of this at your meeting. We are directed by law to do what we can. The forest reserves are being thoroughly searched for the blight and where found it is destroyed. No specific remedy has been found. The only effective thing we know today is to cut down the infected trees and burn them, even to the stump and branches. However, where the tree has marketable timber in it, the bark is removed and the wood put to commercial use.

I don't know whether you are familiar with this fungus. I have here a number of twigs of trees in which this disease is present. If you care to look at them they are here for that purpose. Now, I am not an alarmist, and do not want you to think so, but, I am confident of this one thing. That unless the chestnut blight is stopped in its march across the State, it will destroy all Pennsylvania chestnut trees, and will do it in a few years. The value of the chestnut timber is too great to let it go by the board. The Legislature saw this, provided for a Commission, and the Commission is producing results. It is known that the chestnut tree blight is not, as was at first supposed, an insect, but a fungus, which attacks the bark of the tree, cuts off the circulation, and finally girdles and thus kills the tree. In this bottle is a piece of chestnut branch covered with pustules of the blight. This has been in the bottle forty-one months, and you will see the disease still has considerable vitality. We had these bottles in Pittsburg last fall, and the tops were tied on to prevent the spread of spores. Here is a specimen which has a split in the bark on one side. Just how the split was made we don't know, but believe that the spores of the disease were carried there and then began their work right and left through the bark, until the tree was girdled. This fungus belongs to the same order of plants as the black knot on the plum trees, or the ergot in the rye fields. It is spread by means of spores carried by various means. There is this, however, that is hopeful—wherever you find infection, you will find other trees nearby where infection has not started. It does not march ahead like a column of soldiers, but goes forward and attacks in spots.

The Department is doing what it can, as already said, and only the future can tell what the result of their efforts will be. Whether it will be successful or unsuccessful we are not able to predict at this time. Suppose it be unsuccessful. We will then have the satisfaction of knowing that Pennsylvania was the only state with the courage to stand up and say in the face of the invasion of this disease, that she would not be indifferent about it, but would do what she could to prevent the destruction of one of her most valuable forest trees. If it be a failure, the whole moral effect of the effort will be of lasting benefit to the State.

Here is a piece of chestnut which I brought from Long Island in the summer of 1909. This you may handle with impunity, without

danger of carrying the spores. In handling it, you will notice how punky it is. That is the result of the disease. As you go across the State this summer you will notice trees wholly or partly killed by this disease.

Now, the thing for Pennsylvania to do is to recognize fully that this thing is among us, and if there is anything to be done to protect the State, it must be done at once; not five years from now, but immediately.

I think I may say one thing more, and that is, that a joint meeting of the representatives of some twenty states is called to meet in Harrisburg the latter part of next month to consider this new situation. The problem is much more serious in the states south of us than it is with us, although we are vitally interested; and it is hoped from this meeting there will result a uniform plan of attack among the states where the disease is active.

MR. DeWITT: Will this blight attack any other forest trees?

MR. WILLIAMS: Not so far as we know. It is one of a germs of plants which there are many species. Their technical name of the germs is *Diaporthe*, and this is the only species we know that attacks chestnut trees.

MR. WELLER: Is there any way of detecting it on the trees at this season of the year?

MR. WILLIAMS: Yes, the appearance at this season of the year of a tree attacked by the blight is very distinctive. On the branches of the tree, you will likely find undersized dried leaves which have not fallen; near the point of infection you may find a large number of sprouts or suckers that have been thrown out by the trees on an endeavor to overcome the attack. A tree's bark is full of latent buds and when it is attacked by the disease, the interruption to sap flow forces these buds out. If you see sprouts in clusters it is indicative of an attack.

MR. BIDDLE: Is there any blight reported in Bedford county?

MR. WILLIAMS: Not so far as I know; but it is in Washington county, down near Pittsburg. I suppose the infected trees will be destroyed by this time, because the owner agreed to this.

MR. WELLER: Down in Somerset county we had samples of it in our institute a few weeks ago.

MR. WILLIAMS: It has also appeared in the other direction, in Sullivan county. It is a peculiar thing about this disease that it is sporadic, and attacks in spots, while it may not affect areas nearby.

MR. HUTCHISON: Does it not appear on the stump of the tree? I got this from a Forester of the United States. We had one of them lecture to our Pomona Grange the other day, and he told the people that even if the tree was cut down it would appear on the stumps, or even the place where the stump was removed.



MR. WILLIAMS: That is entirely true. Near Philadelphia in 1910, we found trees that originally were infected near the top; but those infected at the top also developed spores near the base of the tree. Therefore, if you find an infected tree crown you will probably find it infected also near the base, it is necessary to take the bark from the stump and burn it. Even wood from an infected tree, with the bark taken off, may carry spores for a long time. I remember a case where parts of a rail fence were made from an infected tree, and the blight grew upon the rails. It is necessary that one be careful to remove all bark from the stump, and destroy it.

MR. WELLER: You spoke of getting this from Long Island. Is there any difficulty with it there?

MR. WILLIAMS: The western part of Long Island has been practically stripped of the chestnut tree by this blight, and the park authorities east of Brooklyn, cut down last year, I think, 18,000 trees which had been attacked. It has not attacked the eastern end of the island, but at the rate it is going, it will get there too, and not a chestnut tree is likely to remain on Long Island. This specimen came out of Forest Park, Brooklyn.

The CHAIRMAN: We have one more subject; it is Mr. Hutchison.

MR. HUTCHISON: I delivered my speech yesterday.

The SECRETARY: We should like to hear a few words from our Superintendent of Public Instruction, Dr. Schaeffer.

Dr. Schaeffer spoke as follows:

#### ADDRESS OF DR. N. C. SCHAEFFER

I really have no speech. I enjoyed associating with the farmers, and during this week I have been "with the farmer" all the time.

If anything interests me, it is carrying agriculture into the public school. The thing that surprised me a little was, that that particular topic did not appear on the program, because I wish you could have had a chance to discuss it. By this I mean that there will be an expert in agricultural education connected with the Department of Public Instruction, and he will be able to talk with some authority.

I always come to this meeting when I can. I grew up a farmer, but my father early discovered that I would not be worth a copper as a farmer, and he allowed me to be a school master, but in my latter days I see what I missed in not studying what would make the farm attractive.

I happen to own a tract of chestnut timber that belonged to my father. I have never seen it; it is in Berks county. I also own a farm near Reading, which also belonged to him. I consider it a very profitable investment, because whenever anything has to be bought for the farm, I pay for it out of my salary, and whenever anything is sold, I put it down as profit.

I just want to say one thing: I suppose I got all the school advantages that come to a farmer's boy. When I was about ten years



old, I was sent to the McAllisterville Academy, in Juniata county, and I was sent to College, and studied in three universities abroad, and some of the institutions in this country, and in all the years I was at school, I was never taught to know what would make me a better farmer. Now, I am glad there is a change coming over our schools, and this change is coming just as fast as you farmers want it to come, and not a bit faster. The idea that a lot of young girl school teachers, who are getting forty dollars a month, should accomplish anything great in teaching agriculture in the schools, is simply preposterous, and you men who represent this State Board of Agriculture, and are being taught the latest things in connection with agriculture, will have to help to get agriculture taught in some rational way in our Township High Schools. This last summer I went to a neighboring state in order to see how they did it there. Well, they had four expert lecturers, and if I wanted to kill agriculture in Pennsylvania, I would import any one of these four. One of them talked as though anybody could teach agriculture; the next one went off on the value of snakes to the farm—a subject which may do very well for Trinidad, where snakes are one of the crops. I heard a third one, who had some little idea that there might be an entering wedge for this subject; but I came home thoroughly imbued with the idea that we will have to do a little more before we can get agriculture thoroughly taught in the schools.

I am glad to have had these few minutes to throw off the feelings of my heart. I am interested in agriculture in the schools, without destroying the legendary function of the schools, as it has come down through the ages. The school is completely out of adjustment with the conditions of today.

The SECRETARY: Mr. Chairman, we have about reached the point in our program when the farmer's bedtime approaches. Before we close, as Secretary of the State Board, as Secretary of Agriculture, as the head of the Department, and as representing the agricultural interests of Pennsylvania, I want to thank you for your faithful attendance at the meeting. I have never been more gratified than at this session, with the very regular and prompt attention with which you have been found in your places at the beginning of each session. It has been very gratifying to me.

I want to say to you that Prof. John Hamilton yesterday expressed my sentiments more fully than I can express them myself, on the great good that has been done by the Department of Agriculture. Those of you who were in the Civil War, will remember how strong we felt when we knew we were strongly reinforced, and how timid we were when we knew we had no reinforcements, and I have no doubt that Brother Martin will agree with me when I say that you have no idea what strength it gives us to know that this great body of farmers is standing behind us as a reinforcement.

I want to thank you again, in the name of the farmers of Pennsylvania, for your very regular attendance at this meeting.

Now, then, before adjournment, I want to say that, as usual, the vouchers will be sent to you, and you will make them out and return them to us, and we will send you the money.

There is so much to do that we have to come here at nine o'clock in the morning, and stay until nine or ten at night, and you have

no opportunity to see the city; so the State can afford to pay your expenses for another day, if you wish to stay over and go home on Saturday. It is as little as it can do, in recognition of your services.

There are other things I would like to speak of if I had the time, but unless some one has something to say, I think we had better adjourn.

MR. GEORGE: Mr. Chairman, we have been here now for pretty nearly two days, and have not heard from our Director of Institutes. I would like to hear something from Mr. Martin.

MR. MARTIN: Mr. Chairman, and Fellow Co-workers: I can not find language to express the pleasure I have enjoyed the last two days in meeting with you here in this strong and inspiring meeting, developing so many of the problems of agriculture. But there is another side to this meeting. Most of you, I think, have looked at the chart over there, showing the statistics relative to the great work of the Farmers' Institute, which is largely the result of strong co-operative effort in the development of agriculture, and I take this opportunity, with our good Secretary of Agriculture, to express my gratification, and to wish you all a safe and pleasant journey home, to find your families enjoying good health.

The CHAIRMAN: Is there anything further. If not, a motion to adjourn will be in order.

MR. JOEL A. HERR: I move we adjourn.

This motion was properly seconded and duly carried in the regular way.

Adjourned.



*Secretary of Agriculture.*